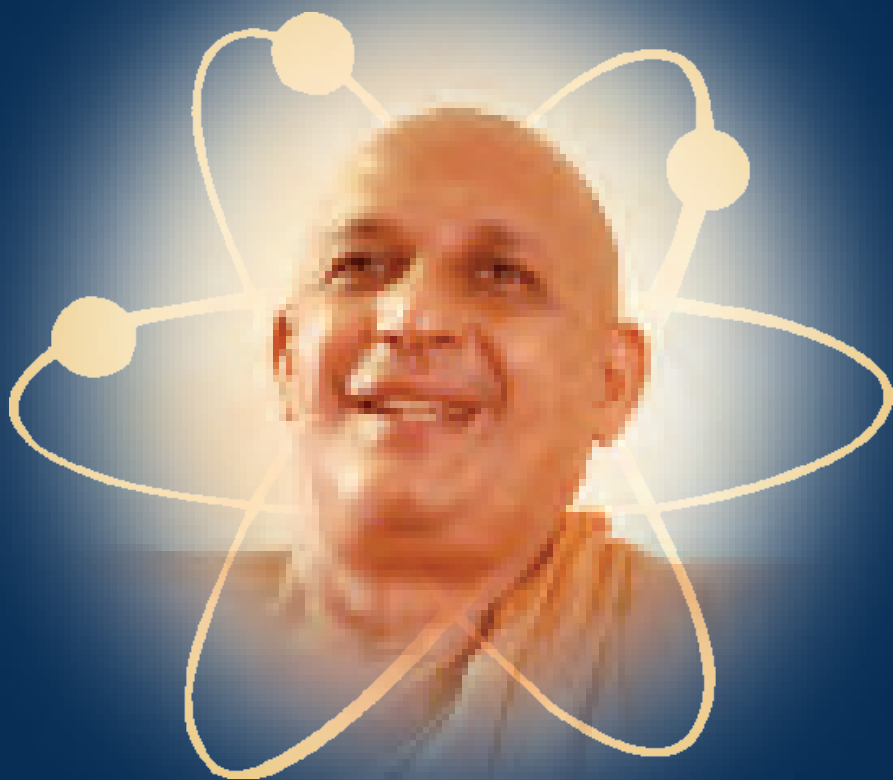


YOGA RESEARCH FOUNDATION: VOLUME TWO

Promotion of Health 1998–2007



Yoga Publications Trust, Munger, Bihar, India

Promotion of Health 1998–2007

With kind regards, ॐ and prem

Sriani Nivaran

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Yoga Publications Trust, Munger, Bihar, India

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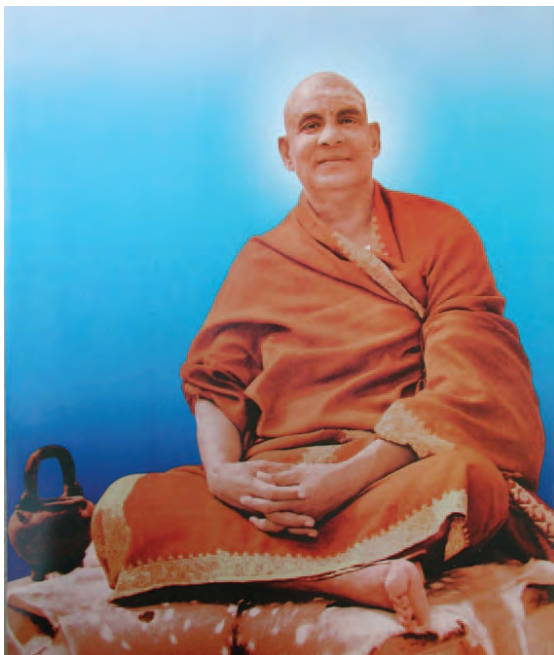
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Dedication

*In humility we offer this dedication to
Swami Sivananda Saraswati, who initiated
Swami Satyananda Saraswati into the secrets of yoga.*

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Preface

Yoga Research Foundation was founded by Swami Satyananda Saraswati in 1984, in Munger. The aim of the institution was to investigate and validate the many aspects of yoga, its techniques, practices and postulates in a scientific manner.

Already in 1977, Sri Swami Satyananda had established the Research Co-ordinating Centre with the same idea and purpose. One of his major contributions in the field of yoga was to introduce yoga to the world of medical and scientific research. Yoga was no longer to be a secret science for sadhus and ascetics, but accessible to one and all. The benefits of yoga are not only a reality experienced by the individual; they can be measured, monitored and analyzed with the most sophisticated scientific equipment available.

Sri Swami Satyananda initiated a worldwide movement of yoga research which carried out projects at hospitals, psychiatric clinics, colleges and universities.

On the occasion of the 14th Foundation Day of Bihar School of Yoga, on 24 January 1977, Swami Satyananda Saraswati addressed a gathering at Sivanandashram in Munger, announcing the creation of the Research Co-ordinating Centre. The following is an excerpt of the address he delivered:

People are coming to Munger from all over the world in order to learn yoga, not only Hindus but people from all religions and walks of life. Today, everyone

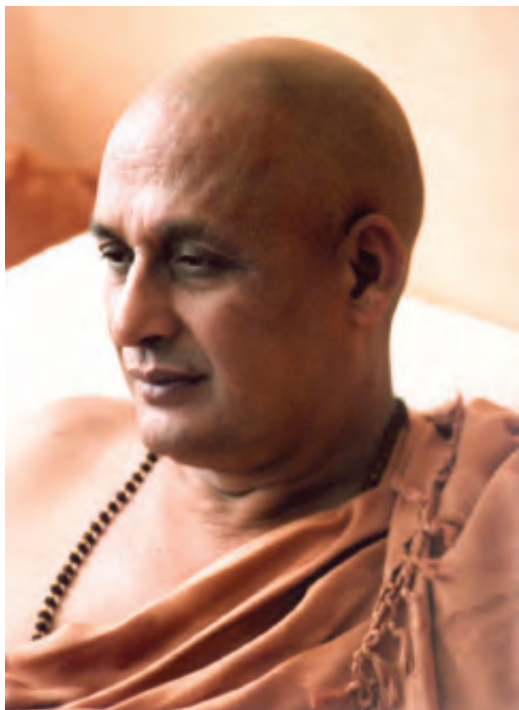
from king to beggar is perplexed, restless, and wants to learn yoga to concentrate the mind, in order to find peace and free their body and mind from disease and tension. This is why our small ashram is transmitting the message of yoga to the whole world.

Many of my sannyasin disciples are doctors, engineers, philosophers and psychologists. Being highly trained, they have a basic understanding of the scientific yogic research going on around the world. Through them whatever research is being done on yoga, East and West, will be brought here, collated and conveyed in a readable form to the people. Our aim is to convey information about the investigations going on in the world. How are alpha waves produced while singing kirtan? How does japa influence blood pressure? What is the effect of relaxation on the mind? What does science have to say about yoga? Over the last five hundred years we have forgotten our yogic culture and spiritual knowledge has nearly disappeared. Today, however, there is a great yogic renaissance going on around the world and spiritual knowledge is again manifesting.

Finally, to all yoga lovers I express the wish that they may share their knowledge and experience with us in the form of assistance and cooperation, so that we can impart this knowledge to the maximum number of people through our new research coordinating centre.

Yoga Research Foundation continues to this day to uphold the vision of Sri Swami Satyananda. Research is carried out at Ganga Darshan, in India, and by centres around the world. The effects of yoga practices are under investigation, as well as the impact of certain yogic practices and yogic lifestyle on physical and mental imbalance. The invitation which Sri Swami Satyananda extended to the scientific and yoga communities remains open, and all are welcome to share their knowledge, understanding and findings of their research into yoga.

MESSAGE FROM SRI SWAMI SATYANANDA TO YOGA RESEARCH FOUNDATION



Yoga Research Foundation was founded in 1984 and now in 1989 the projects and plans which we had envisaged are finally taking a dynamic shape.

I am confident that the Yoga Research Foundation will provide a scientific interpretation of the practices of yoga. Research conducted all over the world has amply indicated this possibility.

Although I am not personally present on this occasion, my thoughts and my spirit are always with the activities of the Foundation, for this is one dream I have cherished.

Swami Satyananda

Introduction

Yoga Research Foundation: Volume Two, Promotion of Health 1998–2007, presents the findings of various research projects undertaken by the Yoga Research Foundation, Munger, Bihar, to observe the effect of Satyananda Yoga on various illnesses. These research studies were carried out during the period spanning 1998 to 2007. They cover three major conditions: Type II diabetes mellitus, high blood pressure, and asthma. These conditions have a high incidence and a high morbidity and mortality rate around the world. They affect the day-to-day quality of life, produce incapacitating side effects, decrease productivity at the workplace, damage various organs and can ultimately lead to death. The aim of the research projects was to find out how yoga can assist people regain their health along with any therapy prescribed by their medical doctor.

Studies on Type II diabetes mellitus were conducted in the ashram environment at Ganga Darshan, Munger, Bihar,. The subjects were participating in a residential yoga course. Hence the yoga practices and the yogic environment had a combined effect on the results obtained. The participants' medication was completely withdrawn for a time and restarted towards the end of the course, adjusting the dose as required.

Studies on high blood pressure and asthma were conducted in the home environment. The subjects were living their regular routine in the family as well as at the workplace.

Hence the effects could be attributed solely to yoga practices. The subjects continued medication as per the advice of their medical doctor.

The results were encouraging. Since the research project concluded in 2007 more work has been completed worldwide. Before the efficacy of yoga can be established beyond doubt, future studies need to be conducted with a larger number of participants and under more controlled environments to rule out the overlapping effects of multiple influencing factors.

At this stage, the practice of yoga is recommended as a complementary process for managing disease and regaining health.

The bigger picture

Short excerpts compiled from the teachings of Swami Sivananda Saraswati, Swami Satyananda Saraswati and Swami Niranjanananda Saraswati have been included here to give a wider perspective. These excerpts enhance the understanding of the role yoga can play in the management of physical and mental imbalances. They offer a holistic outlook on illness and recommend practical ways of integrating yoga into one's day-to-day life, thereby creating a yogic lifestyle for oneself. Health and ill health are conditions of body and mind. Wrong or inappropriate thinking is the cause of wrong or inadequate functioning of the body. Both areas have to be dealt with simultaneously to develop the quality of one's being and life.

The connection between body and mind was known to the masters of yoga who have given guidance and inspiration on how to manage ill health and how to promote good health through an understanding of one's place and role in life. Physical health is not an isolated phenomenon; it is a mirror of one's mind, of the way the mind is experienced and expressed. Yoga reaches out to all levels of human experience and expression with the aim to create harmony and bring peace to the individual and society.

The Yoga Capsule

The present volume concludes with yoga practices selected to help manage the conditions of diabetes mellitus, high blood pressure and asthma. These are yoga capsules or short sessions of practice, which can be introduced at different times during the day. This will allow for a slow change not only in the physical condition of the practitioner, but above all in the lifestyle and quality of life. For the root cause of imbalance in the bodily functions is often an imbalance in one's lifestyle. Yoga capsules readjust this situation by allowing one to step out of the hustle and bustle of daily life and reconnect to one's own self.

Yoga addresses the body, mind, emotions, the psyche and spirit of each individual. Therefore, it would do injustice to the wealth and vidya of yoga to consider it as a therapy for physical ailments. Yoga is much more. By practising the yoga capsules with regularity, with sincerity and faith the perception of oneself and one's environment will alter. One will be able to modify and improve one's interactions with others.

For the suggested practices one should refer to *Asana Pranayama Mudra Bandha* of Yoga Publications Trust and seek the guidance of a competent yoga teacher. Yoga does not replace prescribed medication. The advice of one's medical practitioner must be followed and any change of one's condition discussed accordingly.

Understanding Statistics

Statistics are a play of numbers. One should know how to interpret the numbers. If wrongly presented to a person with little knowledge of statistics, the reading will lead to wrong conclusions.

The following brief description of terms is meant to help the layperson understand the intricacies of statistics as used by Yoga Research Foundation.

RESEARCH DESIGNS

Pre-post design: The same set of subjects are observed for a given parameter (example: blood pressure) before and after an intervention (example: 5 rounds of surya namaskara at medium speed). The observations are then compared using appropriate statistical methods.

Repeated measure trial: The subjects are observed once or more frequently during the trial period and not only at the beginning and end of the trial.

Controlled trial: One group of subjects are observed for a given parameter before and after an intervention; another similar group of subjects are observed in the same way but without any intervention. The two groups are then compared using appropriate statistical methods.

The first group is known as the experimental group (also known as yoga group in studies conducted by Yoga Research Foundation). The second group is known as the control group. The control group instead of having no intervention in some research studies may have another comparable intervention (example: asana versus physical exercise).

Random controlled trial: The subjects are assigned to either the experimental group or the control group at random, not selectively.

BASIC CONCEPTS

Hypothesis: It is a statement that describes the expected result of a research study (example: regular practice of ten minutes of ujjayi pranayama will reduce systolic pressure by 10 mmHg in a hypertensive person).

When the expected results of a research study are not specific they are called the ‘aims’ of the study (example: effects of ujjayi pranayama on blood pressure in hypertensive subjects).

Null hypothesis: It is a hypothesis that is directly counter to what one hopes to show (example: stressed individuals do not differ from normal individuals in aberrant behaviour).

Sample size (n or N): This refers to the total number of subjects under observation.

MEASURES OF ANALYSIS

Mean score: It is an arithmetic average of a set of scores.

Percentile: It refers to the point below which a specified percentage of observations falls.

Median or 50 percentile score is the score corresponding to the point having 50% of the observations below it when

observations are arranged in numerical order. Therefore, if scores were to be arranged by ranking, the mid-point ranking is the median.

25 & 75 percentile scores is the score corresponding to the point having 25% & 75% of the observations below it respectively when observations are arranged in numerical order.

Standard deviation: It is a score that depicts how individual or group scores are dispersed around the mean score; the smaller the standard deviation, the more closely clustered the scores are to the mean score, or the more uniform the group.

A high standard deviation score indicates that individual scores differ widely from each other.

When calculating significance, the standard deviation is used as the denominator (divisor). Therefore, the higher the denominator, the greater the nominator is needed in order to get the same result. That means that if the standard deviation score is high, a greater degree of change is needed in the individual scores to make the result significant.

Significance: This refers to the probability with which a hypothesis might be rejected when it is in fact correct. In other words, the significance level indicates that there is insufficient reason to believe the hypothesis is incorrect.

The smaller the number, the greater the significance. Usually a significance value of 0.01 or 0.05 or less is acceptable. It means that there is 1 (or 5) in 10,000 chance of the concerned hypothesis to be wrong when actually it is correct.

Factors influencing significance

1. Actual difference in values between two observations: There is a direct influence between the difference in values and significance. Therefore, the greater the difference between the pre-reading and the post-reading, the higher will be the significance.
2. Magnitude of the sample variance: The degree to which the individual observations differ from each other. There

is an inverse influence between the difference in values and significance. Therefore, the greater the sample variance, the less significant the results.

3. Sample size: There is a direct influence between sample size and significance. Therefore, the larger the sample group the greater the significance.

However, this can be misleading. If the sample size is enormous, a small change will be shown as significant. For example, in a group of 600 subjects with high blood pressure the reduction of blood pressure from 158 to 156 mmHg will be shown statistically as significant, but clinically it is insignificant and means nothing to the doctor or patient.

Similarly, if the sample size is too small, a moderate change can be statistically insignificant but indicate a useful change. Indeed, the study must be repeated with a larger sample to come to a final conclusion.

4. Chosen level of significance: Usually it is either 0.01 or 0.05. The lower the chosen level of significance, the better the probability that the hypothesis is in fact correct.

Magnitude of effect

To nullify the effects of influencing factors a measure called 'magnitude of effect' is calculated. It is a measure of the degree to which variability among observations can be attributed to interventions. It is a measure used to counteract violations in assuming significance.

'Eta squared', 'Omega squared', 'Effect size' are some of the statistics used to measure magnitude of effect.

Yoga Research Foundation uses 'Eta squared' to express the magnitude of effect. The higher the value of 'Eta squared', the more relevant is the result. A value that is greater than 0.2 is considered acceptable.

Methods of determining significance

1. *Student's t test (t test)*: It is used in pre-post type research designs involving two groups of subjects.

One-tailed t test: The one-tailed t test rejects only one tail of data distribution, the extreme lower end. It is used with homogeneous samples, in cases where the data is more or less equally distributed along the bell graph/on both sides of the mean value.

Two-tailed t test: The two-tailed t test rejects extreme results on both tails of data distribution. It is used in cases where the mean and median are very close together, i.e. when the research sample is not homogeneous.

2. *F Value:* It is commonly used when repeated observations are made over a period of time for a parameter in a sample. It is calculated using a general linear model, repeated measures. It is also used when the experiment involves more than two groups, e.g. yoga group, exercise group, no intervention group. It is calculated using ANOVA (Analysis of variance).

The cut-off value of F statistic at which the hypothesis is accepted (in technical terms, the null hypothesis is rejected) depends upon degree of freedom (df). Then after computation it is expressed as significance.

Degree of freedom (df): It is usually taken as one less than the number of observations in the sample.

3. *Analysis of variance (ANOVA):* This is a statistical technique for testing differences in the means of several groups, not just two as in the t test.

Power: This is the probability of correctly accepting a valid hypothesis (in technical terms, correctly rejecting a false null hypothesis). It denotes the reliability of the findings. The value 1 shows 100% reliability, 0.5 shows 50% reliability. A very good reliability or power is 0.8 and above.

DISPLAYING DATA

Bar graph: This is a graphical representation in which the frequency of occurrence or quantity of different variables on the X axis (horizontal axis) is represented by the height of the bars.

Line graph: It refers to a graphical representation in which the Y axis (vertical axis) values corresponding to different values of the X axis (horizontal axis) are connected by a line. In this way its use is the same as the bar chart. It is also useful for time-series data.

Boxplot graph (box and whisker plot): It is a graphical representation of the dispersion and variability of a sample. The lower hinge of the box denotes 25 percentile, the upper limit, hinge 75 percentile and the middle line 50 percentile or median.

Components of a boxplot graph

H-spread: It refers to the area between the two hinges (the actual box).

Hinges: They are those points that cut off the bottom and top quarter of a distribution. They display the middle 50% of the scores.

Whisker: It is the line extending from the upper and/or lower hinge representing observations less than 25 percentile or more than 75 percentile. A whisker is not longer than 1.5 times the H-spread.

Outlier: It is an observation lying outside the limit of the whisker. In the research studies conducted by Yoga Research Foundation all outliers have been hidden from the graphs.

LIST OF ABBREVIATIONS

N=66	N=number of subjects in a research study
BMI	Body Mass Index or Basal Metabolic Index
SBP	Systolic Blood Pressure (blood pressure during rhythmical contraction of the heart)
DBP	Diastolic Blood Pressure (blood pressure during dilation of the heart and arteries)
Kg/m ²	kilogram/square metre (e.g. height in metre squared)
mmHg	millimetre of mercury (Hg), unit used to express blood pressure
h/o	history of
DM	Diabetes Mellitus
HBP	High Blood Pressure
Std dev	Standard deviation
mg%	milligram %
NIDDM	Non-Insulin Dependent Diabetes Mellitus
Blood sugar	
F & PP	Fasting & Post Prandial (two hours after a meal)
HbA1c	Glycosylated Haemoglobin (blood test to determine overall control of blood sugar over a three-month period)
Bl. Glu. F	Blood Glucose/Sugar Fasting
Bl. Glu. PP	Blood Glucose/Sugar Post Prandial (two hours after a meal)
HDL	High Density Lipoprotein
LDL	Low Density Lipoprotein
IHD	Ischemic Heart Disease (heart disease due to inadequate coronary blood to the heart)
ICMR	Indian Council of Medical Research

Yoga and Health

ROSY CHEEKS AND SPARKLY EYES

From the teachings of Swami Sivananda Saraswati

“Wrong thinking is the root cause for human sufferings.”

Health is the state of equilibrium between the three humours of the body – *vata*, *pitta* and *kapha*, wind, bile and phlegm. In this state of balance, the mind and the organs of the body work in harmony, one enjoys peace and happiness, and performs life’s duties with comfort and ease.

Health is that condition in which one has good digestion, good appetite, normal breathing and pulse, good quantity and quality of blood, strong nerves and a calm mind. A sound mind in a sound body, free movement of the bowels, a normal state of urine, rosy cheeks, a shining face and sparkling eyes are signs of good health.

Health is a state in which one sleeps well, is at ease, free from any kind of dis-ease or uneasiness. When one is in a state of perfect health, the heart, lungs, brain, kidneys, liver and intestines all work in perfect concord and discharge their functions satisfactorily. This state is coveted by all.

The actions of the mind are indeed actions. The body is really one’s thoughts, moods, convictions and emotions objectified and made visible to the naked eye. It is a point

worth noting with care that every cell in the body suffers or grows, receives a life impulse or a death impulse from every thought that enters the mind, for one tends to grow into the image of that which one thinks about most. Noble, sublime, loving and kind thoughts should be entertained at all times and a life of harmony, health and beauty will be enjoyed.

Health is a state in which one jumps, sings, smiles, laughs, whistles and moves hither and thither with joy and ecstasy. It is that condition in which one can think properly, speak properly and act with alacrity, nimbleness and vigilance. A life with good health is a blessing indeed.

THE GIFT OF YOGA

From the teachings of Swami Satyananda Saraswati

“Diseases are related to the body, but their cause is the mind.”

In this modern age, people are concerned about vitamins and minerals, but they have forgotten one important thing. Physical health is not the ultimate; it is the state of the inner being which constitutes real health.

In order to gain total health, it is necessary for spiritual life to become the base of one's ordinary life. We consider physical life as the base and spiritual life as an adjunct, but it is the other way around. We have put the cart before the horse. Man's life is essentially spiritual; the physical life is just one part of his existence. In the same way we have been making many mistakes. We say, 'Oh, the divine is within us,' as if we were the containers of the divine, when actually it is we who are in the divinity, not the divinity which is in us. This is a different way of thinking which must be developed in order to correct the errors of body, mind and soul, and create harmony on all levels of our being.

There is no doubt that we have been making mistakes on the mental plane, that we have ignored the mind; and this is how we have become sick and unhappy. When we take to the path of yoga the most important thing for us is the spirit, then the mind, and then the body. In the materialistic philosophy, body is alpha and omega, but in yogic philosophy, body is not the first and last. This physical body is not everything; it is just a small portion of our infinite existence. We have to maintain this body correctly, but not through medicines, tranquillizers and nutritious food alone. We have to supplement right thinking, philosophy, principles and beliefs.

More than that we have to develop the art of dhyana yoga, wherein the eyes are closed but the mind is expanding and becoming more and more brilliant, more aware. Where this little world of name and form alone is not there, but where the infinite existence is before us in an ever-expanding vision of universal life.

Even if a man has no physical sickness, no blood pressure problems, rheumatism, migraine or sinusitis, still you cannot call him healthy. He may not be able to sleep, he may be suffering from anxiety neurosis, or he may be fighting constantly with his family. Physical health is not the ultimate definition of health; this is one important principle of yoga.

A person may achieve fine health through the practices of hatha yoga, asanas, pranayama, right living and right diet, but still he is a very unhappy person. Can you describe a very unhappy man as healthy? Is not unhappiness a disease? What about the mind? How are you going to restore the health of the mind? How are you going to restore happiness within the heart? The mind has to be peaceful, tranquil and full of *ananda*, bliss. This is another central principle of yoga.

What has yoga given to mankind, and what will it give? There are hundreds of thousands of people practising yoga all over the world. They are developing a new quality of mind in order to live in this society. Yoga is giving them hope and optimism, and expanding the horizons of their lives.

What has yoga given to mankind? A religion? An occult sect? No. A science, an experience of transformation of the quality of mind? Yes. This is the practical contribution of yoga to mankind in the past as well as in the future.

CORRECTING IMBALANCE

From the teachings of Swami Niranjanananda Saraswati

“Lack of self-acceptance is the basic cause of disease, whether it be physical or emotional.”

Yoga says that health is not the absence of disease but the proper management of diseased conditions. Yoga does not say that one should never suffer from any kind of disease: rather, yoga says there will be suffering, as that is the natural law, yet if the disease can be managed, that management is health. In the yogic view, health and wellbeing mean adjustment to the prevailing conditions in life, not the absence of disease. According to yogic principles, health is based on common sense. Health is based on how efficiently and effectively the body is used to perform its various functions, without sliding into levels of imbalance which cause illness. Health is not the absence of disease, but the proper management of disease. That is the theory of yoga.

From the yogic perspective, therefore, physical health is the management of various physiological conditions that arise, whether in the form of a simple ailment or a life-threatening disease. The aim of yoga in health is not eradication or curing of the problem, but the management of these conditions. After all, the body is subject to changing conditions, changing health patterns and a changing environment; it will react to these changes either positively or negatively.

If the body reacts in a positive way to a change in diet or environment, such as pollution, then one says, “I have a

strong immune system and nothing affects me. I feel healthy, I feel strong, I feel happy.” But if it responds in a negative way, one starts having breathing problems, cardiac problems and other symptoms that are recognized as disease.

The yogic aim is to convert the negative responses of the body into positive ones. Therefore, it is not the treatment or the curing or the eradication of disease that indicates health, but proper management of the physiological conditions.

The concept of health in yoga is to realize the natural stamina, strength and ability of the body, mind and emotions. The closer one is to one’s natural self, the less problems there are with illness or disease. Most illnesses and diseases are caused by imbalance in the system: malfunction of organs, imbalance in the nervous or hormonal system, imbalance in the emotional structure. If the problem of disease can be overcome by correcting an imbalance, it is more effective and beneficial for physical health.

The experience of optimum health is a transcendental experience, where there are no limitations, where there is no experience of any stressful situations, and where there is a free flow and full awakening of an individual’s energy. Precisely in this light, many scientific experiments have been conducted to see how the practices of asana and pranayama influence the structure of the body and mind.

Yoga says that when there is harmony or tension at the physical level, this is felt by the mind. Conversely, when there is mental tension, it is felt in the body. In the same way when there is harmony, equilibrium and a feeling of optimum health in the body, it is experienced in the brain and in the mind. This state eventually influences the dormant areas of the mind, thus awakening the potential that is inherent within them. This is the concept of total health.

Yoga takes a long time, as it is not dealing with symptomatic treatment. It is not that for a headache one does *neti*, or for diabetes one does this, or for asthma one does that. Yogic techniques relieve the symptoms, there is no denying it, but at the same time, they also work at deeper levels of the

human body, personality and nature. It is not only a question of removing the boil from the body, but also of purifying the blood, eliminating toxins, managing tensions, stresses and the causes of *vikara*, toxins. One follows the guidelines for lifestyle and diet, practises the appropriate hatha yoga techniques regularly and also creates the ability to allow the mind to relax and not to be under continuous stress and tension. One learns to allow the mind to focus and not be like an uncontrolled monkey.

These are the levels where yoga works in order to simply remove one tiny boil. Therefore, it is going to take time just to treat one condition, but this time is well used, providing absolute health, restoring proper efficiency and performance of the afflicted organs and restructuring the entire physical, mental and pranic systems. In yogic management of illness, patience is the first requirement, continuity the second, regularity the third, and adhering to the rules the fourth.

Research

Yoga and Diabetes 1

Yoga has its own definition of disease. Disease manifests in the body but does not originate in the body; disease originates from a state of imbalance. There may be disharmony between the nervous systems or an imbalance in the hormonal secretions, or in the digestive processes. As such, disease is defined in a subtle manner, and treated according to its nature.

For example, yoga does not treat diabetes as a digestive disorder. It is known to be a deficiency in insulin, there is no doubt about it. It is also known that the sympathetic and parasympathetic nervous systems are controlled by higher centres, and when these centres fail to activate the nervous system properly, a deficiency of hormones in a particular area results. When yoga treats a diabetic patient, it is not a treatment for a deficiency of insulin. The patient is not treated for the disease he is apparently suffering from. Yoga recognizes that it is stress and strain which are responsible, so the treatment is for that.

The physical body is influenced by the human mind. It is the sentiments, the emotions, feelings and objectives, passions, fears, anxieties and worries in the mind which create physiological changes in the body. The adrenal, thyroid and pituitary secretions have a natural flow and order. A thought can and does influence the working of the physical body. Fear, psychosis or anxiety influence the endocrine glands and change the mode of brainwaves.

Medicine is a science, but nevertheless the limitations of any science have to be pointed out. For example, diabetes is not a disease of the digestive system. It is a disease which has to do with the nervous system. It is not purely a disease of the pancreatic gland. Glands work on the sympathetic and parasympathetic monitorings. If these nervous systems are blocked, paralyzed, become weak and do not function on account of many factors, these glands which should receive monitoring from the nervous systems do not receive it at all, and consequently the disease related to that particular gland occurs. If the health of the sympathetic and parasympathetic nervous systems can be corrected, not only can the pancreatic glands be rejuvenated, but even the adrenal and thyroid glands.

Insulin, the hormone which regulates the level of blood sugar in the body, is secreted by the islets of Langerhans in the pancreas. This function is affected by forward bending asanas. Diabetics have improved their condition by the regular practice of forward bending poses.

What is the effect of yoga postures on diabetes? What is the effect of hatha yoga on the production of insulin and the capacity to produce insulin? It is taught in elementary science that the pancreas produces insulin and lack of insulin results in diabetes: yoga has gone far beyond that.

Yoga understands that it is the pancreas that is responsible for manifesting insulin but it is the nervous system which is responsible for creating or blocking the process. If one lives a life of stress and strain, shocks are experienced, and these shocks are transferred to the nervous system. As a result, the nervous system does not respond to the needs of the body and it may become incapable of producing the impulses responsible for producing insulin. It is not only applicable to the production of insulin, it is applicable to the production of every hormone in the body: when the impulses of the sympathetic and parasympathetic nervous systems are suppressed, the production of hormones is affected.

Sugar can aggravate it but sugar does not cause it. Food aggravates it, but does not cause it. It is therefore useless to just give up potato, sugar and rice. The cause is not being treated, the symptoms are being treated; it is not sufficient just to take insulin, as this only inserts a chemical which helps to sort out the problems of sugar. Why not revive the natural capacity of the nervous system so that the pancreas produces insulin? This is done through hatha yoga.

—*Swami Satyananda Saraswati*

Research 1: Effect of Yoga on Blood Sugar in Diabetics

Diabetes Health Management Course, 1998

Summary

Sixty-six diabetic subjects adopted yoga practices and the ashram lifestyle for fifteen working days. Their fasting (0.001) as well as post-lunch (0.000) blood sugar levels showed significant improvement.

Introduction

Diabetes mellitus (DM) is a burning health issue the world over; Indians especially are genetically at higher risk to develop diabetes. This metabolic disorder can jeopardize the functioning of all major organs, as well as each cell and capillary in the body. The lifestyle combined with integral yoga practices of Satyananda Yoga are a very effective means to manage this health condition. The Yoga Research Foundation at Ganga Darshan, Munger, did a pilot study in 1998 to observe the effects of Satyananda Yoga on blood sugar levels in diabetics.

Research design

- Progressive uncontrolled pre-post design.
- Statistical calculations were done using SPSS 17 software.
 1. Paired sample two-tailed t test was used to establish the significance of change in variables;
 2. Descriptive study (mean and percentile) – to quantify the change in parameters.

Hypothesis

Regular practice of integral yoga in an ashram environment can significantly reduce fasting and post-lunch blood sugar levels in diabetic subjects.

Parameters

- | | | |
|-------------------------------------|--------------------|------------|
| • Fasting blood sugar | Pathology lab test | Pre & post |
| • 2 hours post-lunch
blood sugar | Pathology lab test | Pre & post |

Method

The study sample consisted of 66 participants of the 18-day Diabetes Health Management Course conducted in 1998 by and at the Bihar School of Yoga at Ganga Darshan, Munger, Bihar, India. All the participants were Type II diabetics; insulin-dependent diabetics were not enrolled in the course. The characteristics of the group are presented in Table 1. The participants gave their individual consent for the research. After their preliminary biodata were collected, and fasting and post-lunch blood tests were completed, they began yoga classes. Daily except Sundays, they participated in a 90-minute asana class and a one-hour pranayama and mantra chanting class, in the morning; one hour of yoga nidra and meditation, and one hour of revision and satsang, in the afternoon; and one hour of bhakti yoga in the evening. The morning asana class was replaced by hatha yoga shatkarmas once a week. They also participated in the daily ashram routine of cleaning the premises for one hour and seva in various departments of the ashram, for one hour. In total, they practised fifteen working days of integral yoga, that is: hatha yoga, raja yoga, bhakti yoga and karma yoga. On the last day, their blood sugar levels were again tested in a laboratory.

Results

Table 1: Characteristics of sample

n=66	Mean	Median	Range
<i>Age (yrs)</i>	49.47	50	17–75
<i>Gender</i>	14 F, 52 M		
<i>Duration (yrs)</i>	6.71	6	0.25–18
<i>BMI (kg/m²)</i>	25.05	24.78	14.15–39.7
<i>SBP (mmHg)</i>	130.88	130	100–180
<i>DBP (mmHg)</i>	83.03	80	60–110
<i>Family h/o DM</i>	16 h/o DM in 1 member, 11 h/o DM in >1 member		
<i>Family h/o HBP</i>	1 h/o HBP in 1 member, 5 h/o HBP in >1 member		
<i>Associated diseases</i>	8 asthma, 24 cardiac problem, 22 obesity, 25 HBP, 15 thyroid problem		

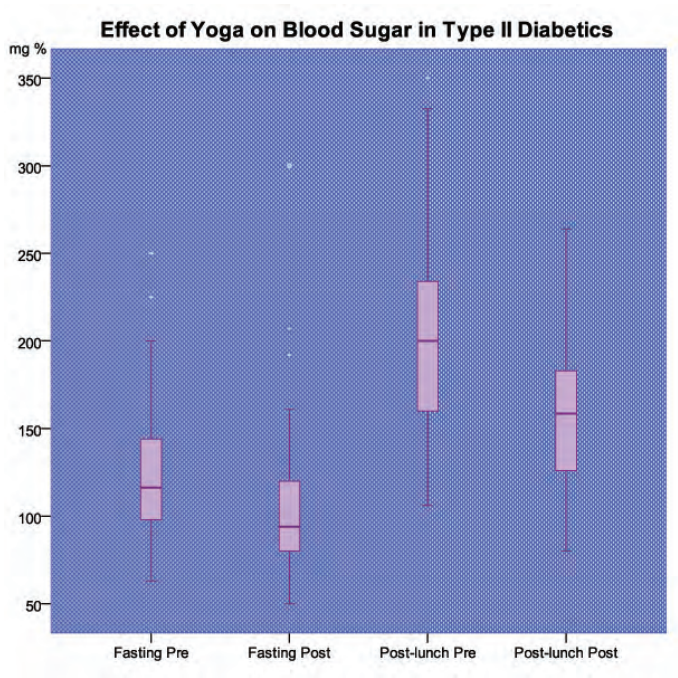
Both blood sugar readings, fasting as well as two hours after lunch, showed significant improvement after fifteen days of Satyananda Yoga practice and ashram life. The results are shown in Tables 2 and 3 and the accompanying graph.

Table 2: Effect of yoga on blood sugar in diabetics: statistical values for significance

n=66	Fasting blood sugar		Post-lunch blood sugar	
	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>
<i>Mean</i>	121.99	104.62	201.16	158.70
<i>Std dev</i>	38.19	39.96	56.81	42.19
<i>t test</i>		3.425		6.309
<i>Significance</i>		0.001		0.000

Table 3: Effect of yoga on blood sugar in diabetics: quantitative values

	Fasting blood sugar		Post-lunch blood sugar	
	<i>Pre</i>	<i>Post</i>	<i>Pre</i>	<i>Post</i>
<i>Mean</i>	121.99	104.62	201.16	158.70
<i>25 percentile</i>	98.00	80.00	160.00	125.75
<i>Median</i>	116.30	94.00	200.00	158.50
<i>75 percentile</i>	145.50	120.50	234.50	183.25



Conclusion

The practice of Satyananda Yoga along with a change of lifestyle significantly lowers blood sugar level in Type II diabetics.

Yoga and Diabetes 2

Diabetes is an organic malfunction in the digestive region. The pancreas generates a secretion called insulin with the purpose to break down the sugar content in the blood. For some reason, either genetic or due to certain bad habits or misuse and abuse of the body the insulin is not produced by the body in a natural manner. So what happens? The sugar content in the blood begins to increase and reaches the critical stage. When the blood is saturated, the sugar content enters the urine. That is the critical point that indicates that you are under the complete control of diabetes. The moment sugar comes into the urine, you know you have lost control of your body. As long as sugar remains confined to the pancreatic behaviour, you can still rectify the damage, but once it enters the urine you need to have insulin injection.

The moment the external agent goes into the body, the natural capacity of your body to produce insulin is blocked permanently due to the outer agent. Once you become dependent on insulin, even yoga does not help. Yoga only helps the condition of diabetes which is known as NIDDM, non-insulin-dependent diabetes mellitus. That condition is manageable through the practices of yoga.

Many times people do not realize that they have diabetes. They discover it when they go for urination and see ants coming. The ants are the first indicators. If ants become

attracted to your urine and sweat drops, you know that you have diabetes.

In 1977, I was involved in one research which was being done by our ashram in Kolkata along with the collaboration of Birla Medical College in Sambalpur, Orissa. We had a group of about fifty non-insulin-dependent diabetic patients. Every week, we used to take their blood, urine and stool samples, carry them in huge thermos from Kolkata to Sambalpur and give them for testing. This research lasted for forty days. It was established that within forty days, the non-insulin-dependent diabetes can be totally regulated. After forty days, when we gave the last class, at the farewell party all students were given rice, potatoes and sweets to eat. That used to be the test: "Okay, now I am clear from diabetes."

In this research, the following practices were used: Laghoo shankhaprakshalana was done on a monthly basis, kunjla and neti was done on a weekly basis. It was a forty-day long course and people of all sizes and shapes, some elderly, some young had come.

For one week, we took them through the pawanmuktasana series to prepare them for the advanced practices. The week concluded with kunjla and neti. The second week, they were taught surya namaskara and certain practices of the second part of pawanmuktasana, the abdominal series, which affect the abdominal region, the liver, the pancreas. The third week, we taught four practices from the advanced series of asanas which were selected specifically for the management of diabetes. Two weeks were like the preparation and the third week was the actual practice of four asanas for diabetes: ardha matsyendrasana, gomukhasana, eka pada paschimottanasana and shashank bhujaingasana. These were the four major asanas that were used for the management of diabetes.

These were the four specific practices for diabetes, which one can also apply to anybody universally anywhere, and diabetics will be benefited. The previous set of asanas play an important role in preparing the body to acknowledge the

effect of these four. Pawanmuktasana 1 to loosen the body and to improve the circulation. Pawanmuktasana 2 to loosen the stiffness from the lower back and to remove gases, bile and mucus in the abdominal region before starting to work with the actual practices for the management of diabetes.

The important practice in the second week along with the digestive practices was the practice of surya namaskara. It is a broad-spectrum practice, what is called the *Ramabana darwa*, from A to Z. It can be applied to prepare the body, to heal the body, to awaken the chakras, to direct your prana shakti. Surya namaskara is one practice which can be physical, psychological and spiritual. The way you use the mantra, the way you use your focus on a chakra and on the speed of the practice, determines what kind of benefit you are going to receive from surya namaskara.

If you want physical benefit, do dynamic surya namaskara. For the purpose of physical health and stamina, dynamic surya namaskara has to be combined with breath awareness. For psychological and mental purpose, for emotional reasons, surya namaskara is to be done in a slow manner with focus on breath and mantra. For pranic and spiritual purpose, for the activation of the chakras, chakra visualization with mantra and breath awareness has to become part of surya namaskara. It is a practice which is the epitome of yogasanas. It is the best series of asanas that yoga has given to us because it covers a wide range, and the healing and health benefit is incredible.

—Swami Niranjanananda Saraswati

Research 2: Effect of Yoga on Blood Sugar and Cardiac Risk Factors in Diabetics

Intensive Diabetes Management Course, May 2002

Summary

Twenty Type II diabetics were subjected to intensive yoga practices based on shatkarmas of hatha yoga and other integrated yoga practices for six weeks. They showed significant improvement in fasting and post-lunch blood glucose levels, and risk factors for diabetes like Basal Metabolic Index (BMI), waist to hip ratio (W:H) and lipid profile. Some of them could also reduce the dosage of their medication. Serial practice of shatkarmas elicited a tendency towards rise in blood pressure (BP).

The incidence of diabetes mellitus (DM) in the Indian population is increasing in epidemic proportions. Insulin resistance is the central problem with Cardiovascular Dysmetabolic Syndrome (CDS), a group of diseases in which the metabolism is deranged. The cardinal imbalances in the process of metabolism are resistance to the action of insulin at the cellular level (secretion of insulin is normal but its action on the receptors at the cellular level is blocked) and dyslipidemia or abnormal lipid profile (high cholesterol and abnormal ratio of different lipids in the blood). CDS leads to diabetes mellitus, high cholesterol, high BP, coronary artery disease and obesity. Some research and individual experience suggest that yoga practices may control not only the blood sugar level but also the other risk factors of CDS. Swami Satyananda Saraswati recommended a regime combining ancient hatha yoga and raja yoga practices for the management and control of DM, based on experiments conducted. He experimented with it and obtained excellent results. The need was felt to bring this technique into the lime-light once again, for the benefit of DM sufferers worldwide.

Hypothesis

A combination of hatha yoga and raja yoga practices will:

- Reduce fasting as well as post-lunch blood sugar levels in Type II diabetics
- Reduce dosage of medication
- Normalize systolic and diastolic BP
- Improve BMI
- Improve waist to hip circumference ratio (W:H)
- Improve lipid profile

Research method

Progressive uncontrolled repeated measure design.

Statistical analysis was done using SPSS 17 software.

1. F statistics using General linear Model, Repeated measures and two-tailed, paired sample Students t test – to establish significance of change in variables within the group – to reject null hypothesis
2. Descriptive study (mean and percentile) – to quantify the change in parameters

Duration of study

The study was conducted at the Bihar School of Yoga, Ganga Darshan, Munger, Bihar, India for six weeks in the summers of 2002 and 2003, with an intention of follow-up for five years.

Parameters

The following parameters were studied:

Parameter	Method	Frequency
• Blood glucose fasting (mg %)	Glucometer	Once a week
• Blood glucose post-lunch (mg %)	Glucometer	Once a week
• Medication	By asking	Once a week
• Systolic & diastolic BP (mmHg)	Digital sphygmomanometer	Once a week

• Body weight (kg) scale	Digital weighing	Once a week
• Basal metabolic Index-BMI (kg/m ²)	Calculated from weight & height	Once a week
• Waist & hip circumfer- ence (cm) W:H ratio	Measure tape	Once a week
• Lipid profile (mg %)	Laboratory test	Pre & post

Subjects

A six-week DM management course was advertised in the journals *Yoga* and *Yogavidya* published by the Bihar School of Yoga. From the applicants, fifteen subjects were accepted in 2002 and five in 2003, using the following selection criteria:

1. Diabetes Type II – NIDDM;
2. Absence of diabetic nephropathy;
3. Absence of major diabetic cardiovascular, ophthalmic or other complications;
4. Absence of major systemic disorder that can limit yogic management.

Method

On admission, the subjects received explanation in detail about the research study and individual consent was obtained from all. They filled in questionnaires which collected general information and information about their health, lifestyle, diet and treatment taken. They underwent clinical examination by the ashram doctor. The yoga classes were conducted from day 2 to day 42. The yoga practices taught were:

- Shatkarmas (5 am to 6 am): Poorna shankhaprakshalana on day 8 followed by laghoo shankhaprakshalana, kunjla kriya and jala neti daily for 28 (planned 35) consecutive days.
- Asanas and pranayamas (9 am to 10.30 am and 2 pm to 2.30 pm): Beginner, intermediate and advanced asanas mainly working on manipura chakra and the counter-poses. Balancing and cooling pranayamas.
- Pratyahara and dharana (2.30 pm to 3.30 pm): yoga nidra, ajapa japa, antar mouna and *Om* chanting.

- Other: Kirtan and chants 60 minutes, brisk walking 45 minutes and cleaning seva 45–60 minutes. In addition subjects attended satsang twice a week for 90 minutes and a lecture once a week for 90 minutes.

When the shatkarmas were stopped from day 33 onwards, that class was replaced by an asana-pranayama class and the afternoon revision of asanas was stopped. In the last week, days 36 to 42, each subject practised personal sadhana in all the asana-pranayama classes.

On the day 8, the day of poorna shankhaprakshalana, all medications were stopped and gradually restarted as per the need as shown in the Tables 3–8.

The subjects followed the ashram's disciplined lifestyle. There was no restriction on diet except that the tea was without sugar and the subjects were requested to avoid sweets as much as possible. It was mango season and the participants could not practise restraint. They were encouraged to keep a diary to improve awareness.

At the end of six weeks each subject was given a personal sadhana to practise regularly at home and was advised medical treatment individually. The subjects were asked to correspond once in three months for follow-up advice. After 12 months, a continuing yoga education (CYE) and reassessment course of one-week duration was held which included the practice of poorna shankhaprakshalana; eight of the subjects participated. The follow-up response was moderate in the first year, with 11 subjects, but it dwindled as time passed by, to four subjects in the second year and only one for the remaining three years.

Different parameters were studied at regular intervals throughout the original six-week period. During the study period of five years, the parameters were monitored at the following frequency. The follow-up response was poor.

- Blood sugar F & PP, once a month
- HbA1c, body weight, BP, medication, symptoms and regularity of yoga, once in 3 months
- Lipid profile, lifestyle, once a year

Results

Table 1: Characteristics of the sample

Characteristic	Description
<i>Gender</i>	13 male; 7 female
<i>Diet</i>	15 vegetarian; 5 non-vegetarian
<i>Medication</i>	13 allopathic; 7 other or no medication
<i>Physical activity</i>	10 regular; 10 irregular or absent
<i>Family h/o DM</i>	4 multiple family members; 8 one parent; 8 Nil
<i>Family h/o high BP</i>	4 one parent; 16 nil
<i>Associated diseases</i>	7 HBP (5 on medication); 2 depression; 1 cervical spondylosis; 2 surgical hysterectomy; 1 peptic ulcer; 1 hypothyroid (on medication)

Table 2: Pre-study health status of the sample

	Range	Mean	Median
<i>Age (years)</i>	30–65	48.20	50.50
<i>Duration of DM (yrs)</i>	0.25–20	5.78	3.5
<i>BMI (kg/sq meter)</i>	17.25–33.15	25.22	24.61
<i>Bl. Glu. F (mg %)</i>	92–316	164.58	148.50
<i>Bl. Glu. PP (mg %)</i>	143–480	249.60	226.80
<i>Systolic BP (mmHg)</i>	104–163	132.80	128.50
<i>Diastolic BP (mmHg)</i>	65–99	83.10	83.00
<i>Total cholesterol (mg %)</i>	150–307.4	200.83	198.45
<i>HDL (mg %)</i>	22–75	40.54	42.45
<i>LDL (mg %)</i>	75–207.5	118.39	117.55
<i>Triglyceride (mg %)</i>	65–415	189.36	163.05

The results of weekly study of blood glucose level can be seen in Tables 3 and 4 and the accompanying graphs. The major effect was evident in the first week itself. The combined effect of yoga practice, simple ashram lifestyle and absence of normal stresses of life resulted in a drop in sugar levels in spite of no change in medication. The decline continued at a reduced rate throughout the study period though the medications were totally stopped after the practice of poorna shankhaprakshalana (PSP) on day 8. On day 35 after the blood tests, the medications were re-introduced to stabilize the subjects on new drug regimes for the last week of their stay at Ganga Darshan. Overall the improvement in blood glucose levels, both fasting and post-lunch, were statistically and clinically significant (see Table 9). The summary of change in medication is shown in Table 5.

During the weekly monitoring, it was found that BP had a tendency to rise (see Tables 6 and 7 and the accompanying graphs). The suspected reasons are the use of salt in the daily practice of laghoo shankhaprakshalana, pingala-dominant heating practices, and cessation of anti-hypertensive drugs in some subjects. Re-introduction of medication in the last week to all who needed it restored it to normal. There were no major changes in drug regime for high BP, except that two hypertensive subjects who were not taking drugs were advised to start. The rise in BP was not statistically significant (see Table 9), but it was clinically significant. The summary of change in medication for BP is shown in Table 8.

Table 3: Fasting blood sugar levels (mg %) in Type II diabetics

n=15	Day 1	Pre PSP Day 7	Post PSP Day 9	Day 15	Day 22	Day 29	Day 35	Day 42
Mean	208.55	176.40	160.20	148.50	150.90	153.55	147.40	142.35
25 percentile	141.25	113.25	107.25	104.50	108.00	111.00	120.75	111.00
Median	206.00	154.50	147.00	125.50	138.00	146.00	145.00	144.00
75 percentile	252.50	225.50	208.25	175.50	191.25	172.75	172.00	167.50
Drug-persons	13	12	0	3	4	5	15	17
Drug-tablets	29	28.5	0	11	14	17	28	31

Table 4: Post-lunch blood sugar levels (mg %) in Type II diabetics

n=15	Day 1	Pre PSP Day 7	Post PSP Day 9	Day 15	Day 22	Day 29	Day 35	Day 42
Mean	291.14	200.86	246.79	209.14	219.21	214.71	245.29	212.71
25 percentile	224.75	154.50	171.00	151.00	167.25	155.00	174.00	167.50
Median	310.00	200.00	280.00	190.00	207.00	184.00	213.50	195.50
75 percentile	365.00	264.75	336.00	249.25	271.75	269.00	303.00	242.00
Drug-persons	13	12	0	3	4	5	15	17
Drug-tablets	29	28.5	0	11	14	17	28	31

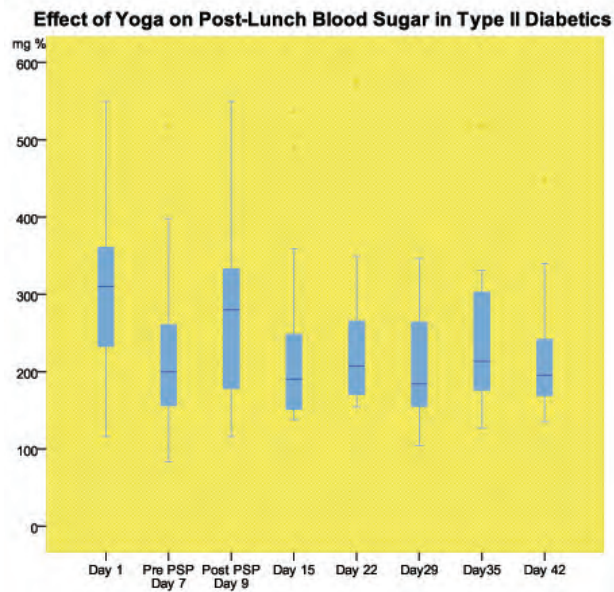
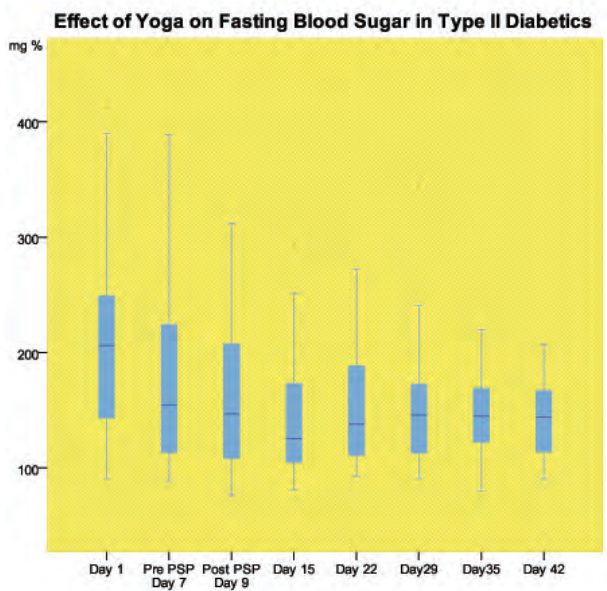


Table 5: Post-study medication in Type II diabetics

Quantity of drugs	No. of subjects
<i>Increased</i>	Nil
<i>Unaltered</i>	7
<i>Decreased</i>	6
<i>Newly started</i>	4
<i>No drug pre & post</i>	3

Table 6: Systolic blood pressure (mmHg) in Type II diabetics

n=15	Pre PSP		Post PSP		Day 15	Day 22	Day 29	Day 35	Day 42
	Day 1	Day 7	Day 9	Day 9					
Mean	131.30	131.10	132.70	131.85	134.80	133.95	133.60	125.35	
25 percentile	122.00	117.25	124.00	119.75	118.75	119.50	116.50	112.25	
Median	128.50	127.50	136.00	132.00	132.00	130.00	134.00	120.50	
75 percentile	141.50	140.75	140.00	142.75	149.75	149.50	145.75	139.25	
Drug-persons	5	5	2	3	3	3	6	7	
Drug-tablets	13.5	13.5	8	10	10	10	14.5	15.5	

Table 7: Diastolic blood pressure (mmHg) in Type II diabetics

n=15	Pre PSP		Post PSP		Day 15	Day 22	Day 29	Day 35	Day 42
	Day 1	Day 7	Day 9	Day 9					
Mean	82.60	82.75	85.20	83.75	86.55	86.30	86.10	82.15	
25 percentile	75.50	77.25	76.75	80.25	78.00	83.00	78.25	75.50	
Median	83.00	83.50	86.00	84.00	88.00	85.50	84.00	81.00	
75 percentile	89.00	87.50	92.25	87.75	93.25	92.00	94.25	87.75	
Drug-persons	5	5	2	3	3	3	6	7	
Drug-tablets	13.5	13.5	8	10	10	10	14.5	15.5	

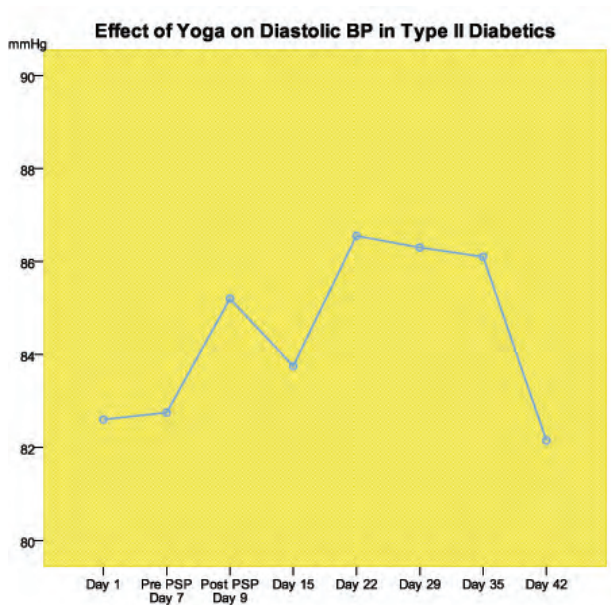
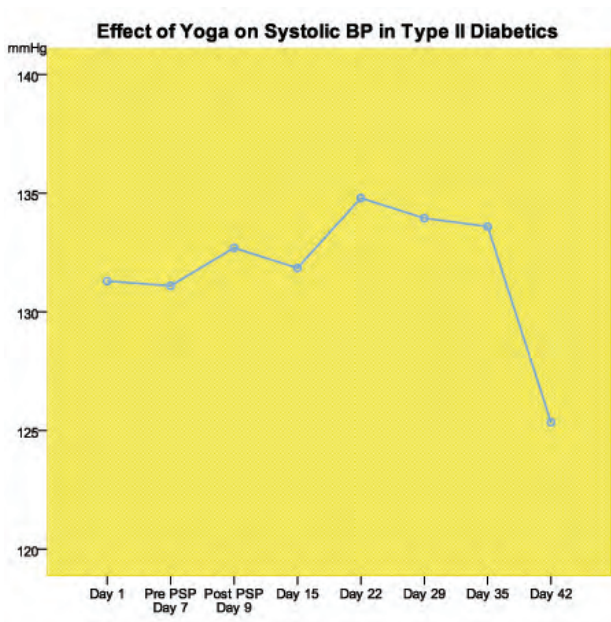


Table 8: Post-study antihypertensive medication in Type II diabetics

Quantity of drugs	No. of subjects
<i>Increased</i>	Nil
<i>Unaltered</i>	4
<i>Decreased</i>	1
<i>Newly started</i>	2*
<i>No drug pre & post</i>	13

*Had high BP to begin with

Table 9: Statistical significance of change in blood sugar, BP & body weight in Type II diabetics

	F	Significance	Partial eta squared	Observed power
<i>Fasting bl. sugar</i>	3.719	0.020	0.667	0.844
<i>Post-lunch bl. sugar</i>	7.656	0.001	0.805	0.994
<i>Systolic BP</i>	2.152	0.110	0.537	0.577
<i>Diastolic BP</i>	2.564	0.068	0.580	0.666
<i>Body weight</i>	10.586	0.000	0.851	1.000

There was gradual reduction in the body weight (see Table 11) and waist and hip circumferences. Maximum weight loss was 6 kg and mean loss was 3.35 kg without any dietary control. Basal Metabolic Index (BMI) was calculated by dividing body weight in kilograms by square of height in meters. All the five metabolic parameters showed significant improvement (see Table 10). Also, there was significant improvement in the lipid profile at the end of six weeks (see Table 12). These parameters indicate high risk for CDS and improvement in these parameters is very beneficial.

Table 10: Metabolic risk factors in Type II diabetics

	Body wt		BMI		Waist		Hip		W/H	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
n=15	68.78	65.41	25.22	23.96	95.45	88.05	98.00	92.75	0.974	0.949
Mean										
Std dev	10.70	9.52	3.77	3.41	11.85	9.73	10.51	8.12	0.077	0.068
t test		8.68		8.87		8.73		6.81		3019
Significance		0.000		0.000		0.000		0.000		0.005

Table 11: Body weight (kg) in Type II diabetics

n=15	Day 1	Pre	PSP	Day 7	Post	PSP	Day 9	Day 15	Day 22	Day 29	Day 35	Day 42
Mean	68.78		66.87		66.74		66.66	66.38	65.71	66.11	65.41	
25 percentile	65.40		63.45		63.20		63.15	62.45	62.60	62.85	61.55	
Median	71.70		68.40		68.60		69.10	68.40	68.60	69.00	68.30	
75 percentile	74.10		73.40		73.50		72.85	72.65	71.35	71.70	71.35	

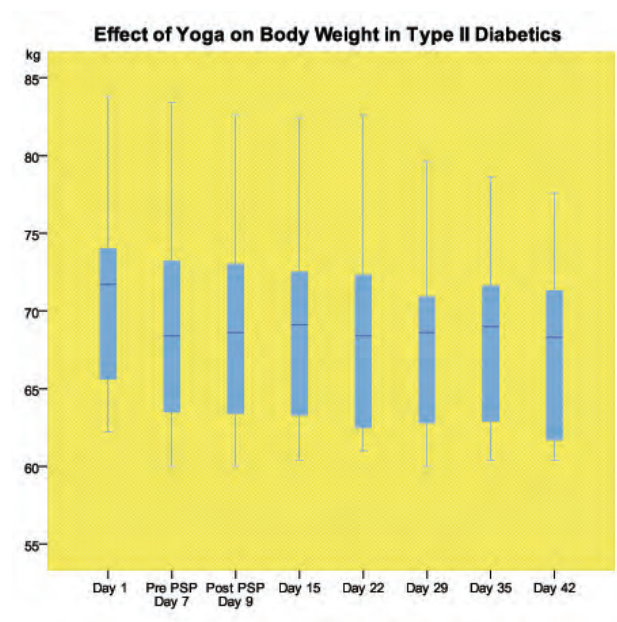
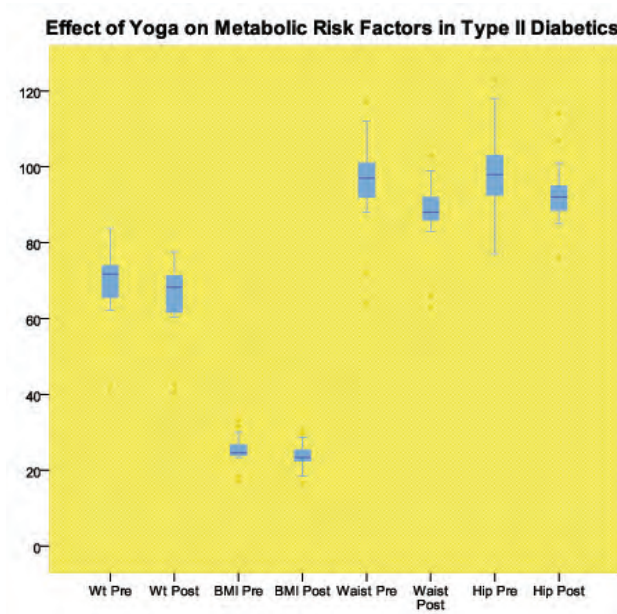
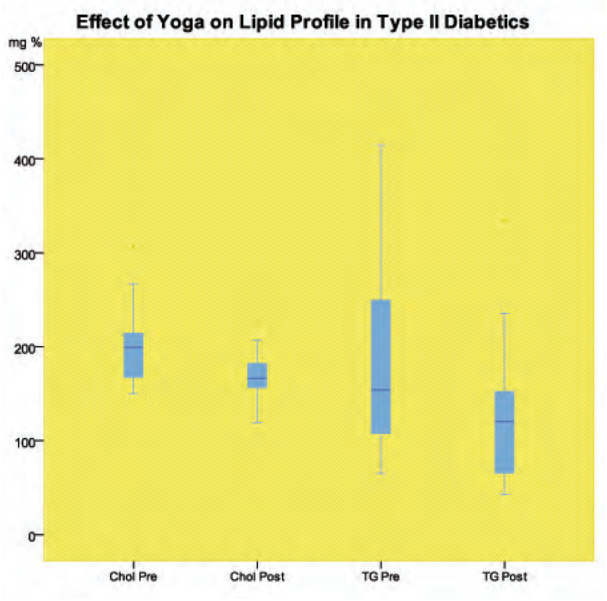


Table 12: Lipid profile in Type II diabetics

	Cholesterol		HDL		LDL		Triglyceride	
n=15	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Mean	201.13	170.36	40.30	36.66	118.62	107.78	189.85	127.14
Std dev	42.99	23.72	12.38	11.63	33.00	20.22	99.93	76.44
t test		3.55		1.58		1.52		4.00
Significance		0.002		0.131		0.146		0.001



Conclusion

The chosen yogic practices were effective in controlling blood sugar levels and also in decreasing the amplitude of the risk factors of DM and CDS. However, it should not be thought that dietary regulations can be neglected. If yoga practices and lifestyle are combined with dietary regulations, the results may be still more impressive.

A combination of selected practices of hatha yoga and raja yoga with lifestyle changes:

- Significantly reduced fasting as well as post-lunch blood sugar levels in Type II diabetics – hypothesis proved.
- Reduced medication dosage in selected cases in Type II diabetics – hypothesis not conclusively proved but not rejected.
- Failed to normalize systolic and diastolic BP in Type II diabetics – hypothesis rejected.
- Significantly reduced body-weight and BMI in Type II diabetics – hypothesis proved.
- Significantly reduced waist and hip circumferences and their ratio in Type II diabetics – hypothesis proved.
- Significantly reduced total cholesterol and triglyceride and reduced LDL in Type II diabetics – hypothesis proved.

Yoga and Hypertension

All over the world there has been a sharp increase in the incidence of a fairly modern disease, hypertension. The hectic pace of life, type of food, environmental pollution, and many other factors are causing hypertension. When this happens, the brain is not able to control the functions of the body. Coronary diseases, as well as many other diseases, occur on account of hypertension.

Hypertension is a state caused by the presence of various toxins, the result of responses to stress. Whenever an insufficient amount of oxygen is inhaled, or if the air one breathes is polluted, the body is stressed. Food which is impure and unnatural, also causes stress to the body. When one has to be alert and cautious all the time, there is further stress.

Tension in the brain affects blood pressure as the veins and arteries, the coronary system, and the whole process of blood pressure regulation is controlled from the brain. These tensions create more possibilities for excess cholesterol to enter the system and the hypertensive condition influences the endocrine secretions. These secretions are directly injected into the bloodstream, and are capable of stimulating or depressing the whole system. When the tensions are too great, the endocrine glands inject hormones directly into the blood influencing the clotting mechanism and ultimately leading to heart attack.

Yoga has been instrumental in reducing hypertensive conditions. Hypertension can be greatly reduced and high blood pressure brought to a normal level by regular practice of yogasanas and pranayamas. The efficiency of the heart action is increased and the heart-lung action is harmonized, helping oxygen to be used at an optimum level.

Simple living and high thinking

How to get out of these hypertension? We have found during our world tours that mostly people suffer from hypertension in the modern world. In the developing countries you have less cases of hypertension. In the developed countries you have a lot of hypertension. The more the country is developed, the more cases you have of hypertension. Another aspect that has come to our notice is that the people who have less material problems have more hypertension, therefore hypertension is not necessarily due to material worries. When you don't have to think about money for living, when you don't have to worry about retirement or mental treatment, why should you have tensions? However, we have found that among these people there are many more people suffering from hypertension.

From this, one point is very clear. It is important that a person must have material problems to get rid of hypertension, because material problems keep a man within a certain space. We have studied the statistics of people suffering from coronary thrombosis. Why should the people who have succeeded in life, in business, in politics, have coronary thrombosis? Here, the emotions come into the picture. A man who succeeds has one type of emotion. The person who fails has a quite different type of emotion. These emotions immediately affect the glands, the hormones and the metabolism.

Successful people become dull, they become great show-offs. They become careless and contented. They think they can do anything with their success. They can fly to America this very afternoon and come back tomorrow morning,

because they have a fat bank balance. This particular process of thinking immediately affects the critical organic process – they have diabetes, blood pressure, coronary thrombosis. If you have difficulties sometimes you have cough and cold, sometimes fever, diarrhoea or dysentery, sometimes headache or pain in the body, but not blood pressure or hypertension, because the problems are being worked out then and there.

In the practice of yoga there is one particular aspect that is emphasized every time – simple living and high thinking. No matter who you are, you may be rich or poor, you may be a big factory owner or a labourer in the streets, you will have to simplify the whole process of living. Simple living is one of the most important ingredients in yoga. Complicated living contributes to hypertension. Complicated living creates a lot of distress in the emotional personality, but in order to live a simple life you should have a very simple mind as well.

—Swami Satyananda Saraswati

A true story

One day a man comes to me and says, “Swamiji, I am having hypertension. Can you suggest something to do?” I asked him, “Do you know the cause of your hypertension? What it could be?” He said, “Yes, I know the cause of my hypertension.” I asked, “What is the cause?” He said, “Well, one day I was lying on the sofa and my daughter-in-law was in a bad mood and called me a ‘lazy dog’.”

The man was affected, and the idea of being a dog became the cause of his hypertension. So I asked him, “Well, when she said that you were a dog, what kind of image did you have in mind of the dog?” So he said, “Well, the street dog, you know, with fleas and flies all over the body, the scrawny-looking starving dog.” I said to him, “Alright, why don’t you change that image into a dog who lives in luxury, who travels in an air-conditioned car, who sleeps

in a bed, who has good food to eat?” Three months later, the man came and told me, “Swamiji, I don’t have any hypertension!” I asked, “How did you manage that?” He said, “I became a beautiful dog of a rich person.” And this is a true story.

—*Swami Niranjanananda Saraswati*

Research 3: Effect of Satyananda Yoga on Hypertension

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Summary

The efficacy of Satyananda Yoga practices as a complementary treatment for hypertension was studied in a controlled progressive trial with 34 subjects in the yoga group and 12 subjects in the control group, using symptoms, objective clinical observations and use of medication as parameters observed over a period of 12 months. We found highly significant relief in four out of six symptoms (F 3.5 to 11.6, significance 0.014 to 0.000), lowering of systolic (F 8.201, significance 0.000) as well as diastolic (F 4.559, significance 0.004) blood pressure and reduction in use of medications (F 3.552, significance 0.014). No significant effect on hypertensive retinopathy was found. The study concluded that Satyananda Yoga as a complementary therapy is effective in the management of hypertension.

Introduction

Due to the modern competitive, fast-paced yet sedentary lifestyle and fat- and protein-rich diet, diseases related to metabolism like hypertension, diabetes and ischemic heart disease are threatening humankind. These ailments need lifelong medical treatment, have high incidence of pathological complications affecting every organ of the body, and increase risk of early death. Yoga has been found to be an effective complementary/alternative method of treatment by many researchers in the past. But no research study with long follow-up is found in the scientific literature.

Satyananda Yoga is an integral combination of hatha yoga, raja yoga, bhakti yoga, mantras, karma yoga and lifestyle that influence the body, mind, emotions, psyche, attitudes and inter-personal relationships. It does not try to heal a particular disease but nurtures the person as a whole.

Yoga Research Foundation, Munger, collaborated with BHEL, (Bharat Heavy Electricals Ltd), Bhopal, a leading Indian industrial house, to study the long-term effects of regular practice of Satyananda Yoga on hypertension. The research was carried out at Kasturba Hospital which is managed by BHEL. We present here the report of this valuable study.

Aim

The present research study was planned with the aim of studying the efficacy of Satyananda Yoga practices as a complementary therapy in the management of hypertension.

Hypothesis

In subjects with hypertension regular practice of Satyananda Yoga:

1. Reduces the symptoms
2. Reduces raised systolic and diastolic BP and pulse-rate
3. Reduces need for consumption of drugs.

Research design

- Controlled progressive trial with repeated measures, allocation of group by subject's choice.
 - Statistical analysis was done using SPSS 17.
1. F statistics using General linear Model, Repeated measures and two-tailed, paired sample Students t test – to establish significance of change in variables within the group, to reject null hypothesis
 2. Descriptive study (mean and percentile) – to quantify the change in parameters
 3. Distribution of severity of symptoms in terms of percentage of subjects

METHOD

A. Duration of study

Each participant was observed for one year in the period between April 2006 and September 2007

B. Selection criteria

Inclusion criteria:

- BHEL employees/retired employees and their dependent family members who are eligible for medical facility at BHEL-run Kasturba Hospital, Bhopal, India, and having established high blood pressure
- Adult male and female below the age of 70 years with no major disease with systemic complications
- Willing to participate in the study

Exclusion criteria:

- Attendance in yoga class less than 35% in the first six months of the study
- Monthly follow-up less than 6 times during the study

C. Parameters

- Symptoms: pre & once a month for 12 months
 - Dizziness
 - Feeling unwell
 - Headache
 - Heaviness in chest
 - Quality of sleep
 - Breathlessness
- Objective clinical observations: pre & once a month for 12 months
 - Systolic & Diastolic Blood Pressure
 - Pulse-rate
 - Basal Metabolic Index (BMI)
 - Waist to hip circumference (W:H)
 - Fundus examination for changes of hypertensive retinopathy: pre & every 6 months
- Use of medication: pre & once a month for 12 months.

D. Procedure of study

Adult patients with established hypertension and of age not more than 70 years, attending the medicine OPD at Kasturba Hospital of the industrial township of BHEL, Bhopal, were informed about the research study. Those who were willing to participate were screened for major medical disorders with systemic complications. On fulfilment of selection criteria and after informed consent, they were allocated to either the control or experimental group by their own choice. If it was convenient for them to attend yoga classes daily over six months they were recruited in the yoga, or experimental, group; if not, then in the control group. On the recruitment of a subject, basic biodata and clinical history were collected and he/she was clinically evaluated. Both the groups continued medical treatment as advised by the doctor and reported for follow-up once every month for the duration of study. The following parameters were recorded every month for both groups:

I. Symptoms measured pre and once a month:

- | | |
|-----------------------|-------------|
| 1. Dizziness | (grade 0–3) |
| 2. Feeling unwell | (grade 0–3) |
| 3. Headache | (grade 0–3) |
| 4. Heaviness in chest | (grade 0–3) |
| 5. Quality of sleep | (grade 0–3) |
| 6. Breathlessness | (grade 0–3) |

All the six symptoms were studied by asking direct questions to the subjects as to how they felt throughout the month. They were recorded in grade zero to three, where zero meant no symptoms, grade 1 mild, grade 2 moderate and grade 3 severe symptoms.

II. Objective clinical observations measured pre and once a month:

1. Systolic Blood Pressure (mmHg), using aneroid sphygmomanometer
2. Diastolic Blood Pressure (mmHg), using aneroid sphygmomanometer
3. Pulse-rate (beats per minute)
4. BMI (body weight in kg/square of height in metre)
5. Waist/hip circumference, each measured in centimetres
6. *Fundus examination for changes of hypertensive retinopathy (pre and every 6 months)

* Fundus of the eye was examined every 6 months using an ophthalmoscope. It was recorded as normal or grade I, II, III or IV as per the Keith-Wagener-Barker classification of fundoscopic changes in hypertensive subjects.

III. Medication measured pre and once a month:

All antihypertensive drugs (daily dose)

The experimental group practised yoga under supervision for one hour six days a week, at least for the first six months. The yoga practices consisted of selected asanas, pranayamas, yoga nidra and other pratyahara and dharana practices. In addition, they practised one of hatha yoga's cleansing practices, jala neti, at regular intervals. They also practised mantra and kirtan (devotional singing) periodically. They were addressed on various yogic concepts such as yogic lifestyle, mantra, bhakti, seva, etc. See Appendix 1 for details of the yoga program. An attendance register was maintained to observe their regularity.

Fifty subjects were recruited for the yoga group and 25 for the control group, but as per the exclusion criteria 16 in the yoga group and 11 in the control group disqualified during the study, leaving 34 in the yoga group and 14 in the control group. The study was conducted between April 2006 and September 2007 at Kasturba Hospital, BHEL, Bhopal, India, and the yoga classes were conducted at Yoga Research

Center, BHEL, Bhopal, under supervision of the Bihar School of Yoga & Yoga Research Foundation, Munger, Bihar, India.

The data was analyzed for descriptive statistic and F statistic, and relevant graphs were plotted using SPSS 17 software.

RESULTS

A. Characteristics of the sample

The demographic details of the 34 subjects in the yoga group and 14 in the control group are presented in Table 1.

Table 1: Hypertension – characteristics of the sample

	Control	Yoga
<i>Number of subjects (n)</i>	14	34
<i>Age in yrs – mean (median) (range)</i>	53.57 (55) (41–64)	57.13 (58) (35–70)
<i>Gender F/M</i>	F=4; M=10	F=11; M=23
<i>Duration in yrs – mean (median) (range)</i>	7.29 (3.25) (1–36)	9.77 (6) (2–22)
<i>Family history of HBP</i>	7	15
<i>Associated diseases</i>	Thyroid=2	DM=10, IHD=11, thyroid=7
<i>Attendance in yoga class in % – mean (range)</i>	Not applicable	61.58 (37.5–85.91)

B. Symptoms

The incidence and severity of all the six symptoms were recorded every month on follow-up visits. The subjects reported 0 when they had no symptom throughout the month, 1 when they had mild symptoms, 2 when moderate

symptoms and 3 when severe symptoms. For simplicity only 5 readings were taken into account during analysis. They are Month 1 or Pre, Month 4 or Quarter 1, Month 7 or Quarter 2, Month 10 or Quarter 3, and Month 13 or Quarter 4. In the yoga group the incidence as well as severity of all the six symptoms reduced steadily and significantly (F 1.498 to 11.690, significance 0.220 to 0.000) while in the control group there was either no change or deterioration (see Tables 2 to 7 and 14 and the accompanying graphs). The line graph shows the variation of intensity of the symptom with time. The line graph of the yoga group is always inclined downwards, indicating steady improvement with continued yoga practice, while that of the control group is more or less level or inclined upwards, showing no change, or deterioration. The stacked bar graph shows the proportion of subjects having no, mild, moderate or severe symptoms at five selected time periods in both groups, separately. Each sub-group of symptom severity is represented in percentage by its colour code within the bar.

For the symptom of headache, F statistic is not significant (see Table 14) though clinically the beneficial effect is quite substantial. The descriptive statistic of mean and standard deviation (see Table 4) quantifies this effect well. The magnitude of change is also evident from the line graph and from the stacked bar graph. The reason for the F statistics to be insignificant is probably that to start with the two groups were not similar; the yoga group had lower incidence of headache, 56%, while the control group had 93% incidence. The second reason is that in the control group the 25 percentile decreased to zero, similar to the yoga group, but the mean and 75 percentile stayed high. These two reasons combined together had a dampening effect on F value. Though statistically the effect is not significant, clinically (practically) it is very significant as evident from the graphs.

Similarly, in case of sleep disturbances, the F statistic is found insignificant (see Table 14) though clinically the beneficial effect is quite substantial. The descriptive

statistic of mean and standard deviation (see Table 6) and the line and stacked bar graphs quantify this effect well. F statistics computation show insignificant improvement probably because in the yoga group, the mean of severity of sleep disturbances decreased but the change was small, as it was low in both the groups to begin with, and so the scope of improvement was also small. In the control group it remained unaltered. The incidence of the symptom improved in a clinically significant way in the yoga group from 47% to 9%, but in the control group it stayed steady at 36% throughout as seen in the stacked bar graph.

C. Objective clinical observations

The five parameters of systolic and diastolic blood pressure, pulse-rate, BMI and waist to hip circumference ratio were recorded every month. For simplicity only 5 readings were taken into account during analysis as in the case of symptoms. The sixth parameter, fundoscopy of eye, was carried out once every six months. The blood pressure, pulse-rate and BMI showed steady improvement throughout but the ratio of circumference of waist over hip did not show much improvement. Fundoscopy also did not show any significant improvement in hypertension induced retinopathy in any of the groups.

In the control group, the mean of pre readings of **systolic blood pressure** was 141.43 mmHg that fluctuated between 142 and 147 mmHg through the study time of 12 months. The yoga group started with a mean systolic BP reading of 150.12 mmHg, and showed steady decrease reaching 127.53 mmHg in the last quarter or month 13. This change is documented in Table 8 and accompanying graphs. In the yoga group, the systolic BP was significantly reduced (F 8.201, significance 0.000) in comparison to the control group (see Table 14).

In the control group the mean of pre readings of **diastolic blood pressure** was 90.71 mmHg that fluctuated between 87 and 91 mmHg. The yoga group started with

a mean diastolic BP reading of 94.41 mmHg and showed steady decrease reaching 82.24 mmHg in the last quarter or Month 13. See Table 9 and accompanying graphs. In the yoga group the diastolic BP was significantly reduced (F 4.559, significance 0.004) in comparison to the control group (see Table 14).

The **pulse-rate** and **BMI** were significantly reduced (F 5.757 and F 3.352, significance 0.001 and 0.019) in the yoga group. See Table 14. In no group substantial changes in **W:H ratio** (F 1.103, significance 0.368) or **hypertensive retinopathy** were found.

The median or 50 percentile is the middle-most reading in a data set of ascending order (mean is the arithmetic average). It divides the data set into two equal halves. The 25 and the 75 percentiles mark the lower most and the upper most quarters respectively of a data set of ascending order. They are best presented graphically in a box and whisker graph. The lower boundary of the box marks 25 percentile and the upper one 75 percentile. The line within the box is 50 percentile. The box and whisker graph gives a detailed picture of the changes occurring in the group.

Blood pressure, the diagnostic parameter of hypertension, showed a highly significant reduction in the yoga group. This established the efficacy of Satyananda Yoga in the management of hypertension. At the same time the pulse-rate also came down significantly. These healing changes in the cardiovascular system were not immediate and dramatic. They came about gradually but they lasted even after the subjects stopped coming to yoga classes. (Subjects were expected to be practising at home). The workload on cardiac muscles is directly proportional to the product of the systolic blood pressure and the pulse-rate: **Cardiac workload $\propto$ (Systolic BP * pulse-rate)**. Reduction in either the systolic BP or the pulse-rate reduces the strain on heart muscles multi-fold, in proportion of product of their multiplication. The present findings show great benefit to the heart function.

D. Medication

Table 12 shows changes in medication regime in both groups. In the control group the mean dosage of medication increased gradually while in the yoga group it reduced steadily (F 3.552, significance 0.014) (see Tables 13 and 14 and accompanying graphs). The box and whisker graph shows that lower boundary of the box and the lower whisker have remained unaltered, indicating that subjects with low medication dosage have continued it. But the upper boundary and the upper whisker have come down, indicating beneficial effect on the subjects taking larger doses of medicine. A box replaced by a line, the median value, indicates that the whole group is taking the same dosage of medicine.

Summary of results

The regular practice of Satyananda Yoga over six months reduced all the common symptoms of high blood pressure. This effect was current as well as long-lasting. The incidences of symptoms of feeling unwell reduced from 94% of subjects to 3%–6%; headache reduced from 56% to 3%; dizziness reduced from 53% to 0–3%; heaviness in chest reduced from 53% to zero; difficulty in breathing reduced from 62% to 3% and disturbances in sleep reduced from 47% to 9%–18% from pre level to the last three months. The means of the severity of these symptoms also reduced steadily over the study period. The improvements in symptoms are very significant (see Tables 2 to 7 and the accompanying charts, and Table 14).

The regular practice of Satyananda Yoga also improved blood pressure, the most important and ‘the’ diagnostic objective clinical parameter of the study, to a great extent. The mean systolic BP decreased from 151 to 131.6 mmHg and the diastolic BP from 94.5 to 82.3 mmHg. This improvement is highly significant. The reduction in mean pulse-rate from 85.07 to 75.57 is also significant. These cardiovascular clinical parameters are accompanied

by reduction in medication in the yoga group making them more relevant. In the yoga group, the mean dose of medication reduced from 2.64 tablets a day to 1.98 tablets a day, while in the control group it rose from 2.82 tablets to 3.21 tablets a day. In the yoga group, four subjects (11.76 %) were asked to stop the medication totally by their doctor and a further thirteen (38.24 %) were recommended to reduce the dose.

The clinical parameters reflecting the status of the risk factors like Basal Metabolic Index (BMI) showed small but significant improvement but ratio of girth of waist to hip did not show much improvement.

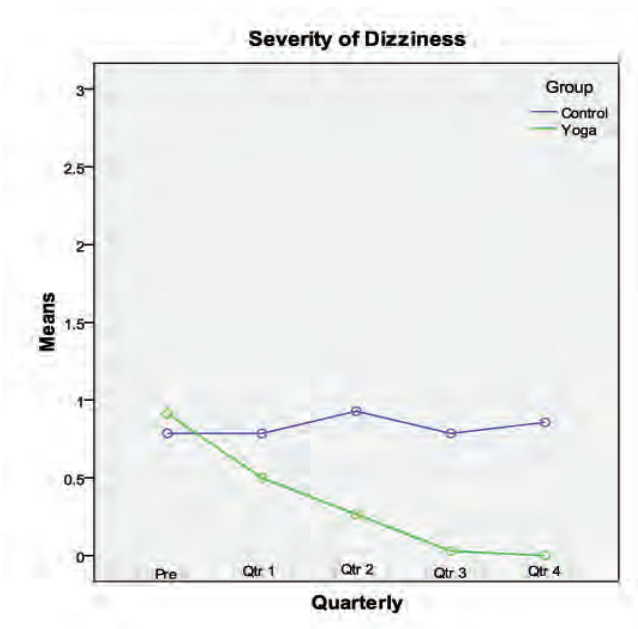
Conclusion

The research study supported following hypothesis. It is concluded that in hypertensive subjects, regular practice of Satyananda Yoga significantly

1. Reduces the symptoms;
2. Reduces raised systolic and diastolic BP and the pulse-rate;
3. Reduces need for consumption of drugs.

Table 2: Hypertension – descriptive statistics for dizziness

	Control (n=14)		Yoga (n=34)	
	Mean	Std dev	Mean	Std dev
Pre (mth 1)	0.79	0.802	0.79	0.802
Qtr 1 (mth 4)	0.79	0.893	0.79	0.893
Qtr 2 (mth 7)	0.93	0.997	0.93	0.997
Qtr 3 (mth10)	0.79	0.975	0.79	0.975
Qtr 4 (mth 13)	0.86	1.027	0.86	1.027



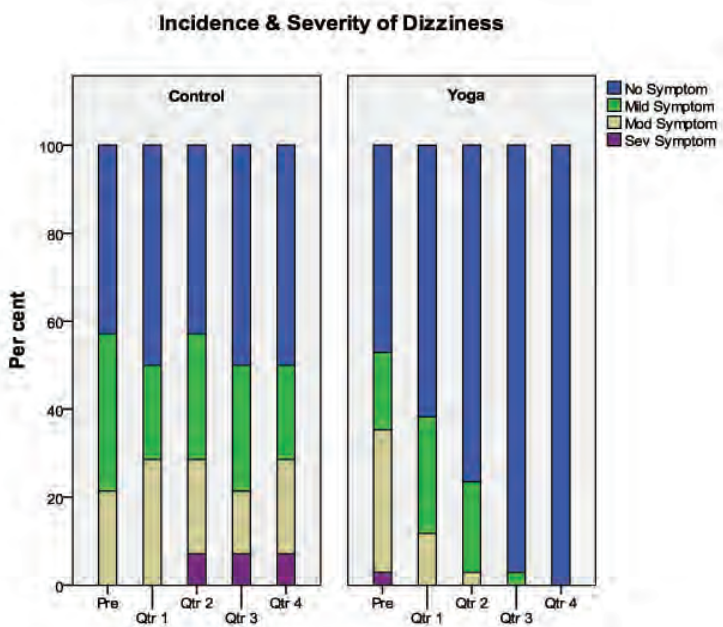
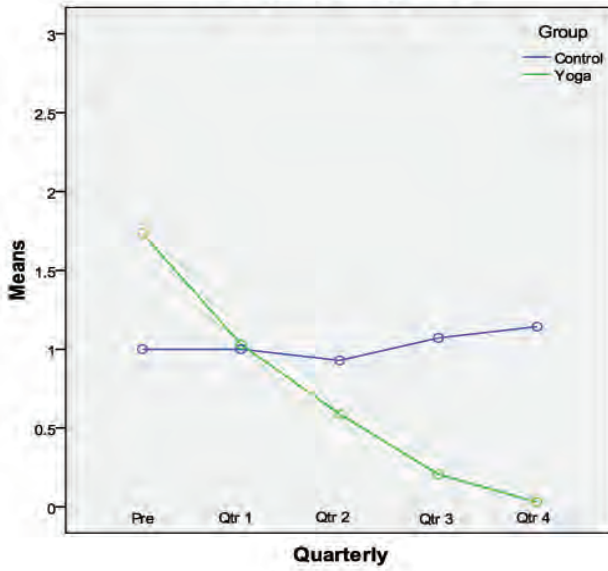


Table 3: Hypertension – descriptive statistics for feeling unwell

	Control (n=14)		Yoga (n=34)	
	Mean	Std dev	Mean	Std dev
Pre (mth 1)	1.00	0.555	1.74	0.790
Qtr 1 (mth 4)	1.00	0.893	1.03	0.717
Qtr 2 (mth 7)	0.93	0.475	0.59	0.609
Qtr 3 (mth 10)	1.07	0.616	0.21	0.410
Qtr 4 (mth 13)	1.14	0.770	0.03	0.171

Severity of Feeling Unwell



Incidence & Severity of Feeling Unwell

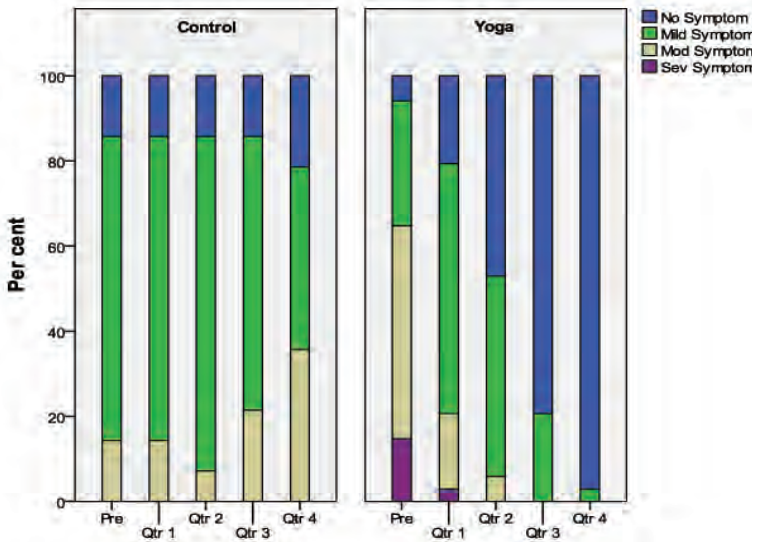
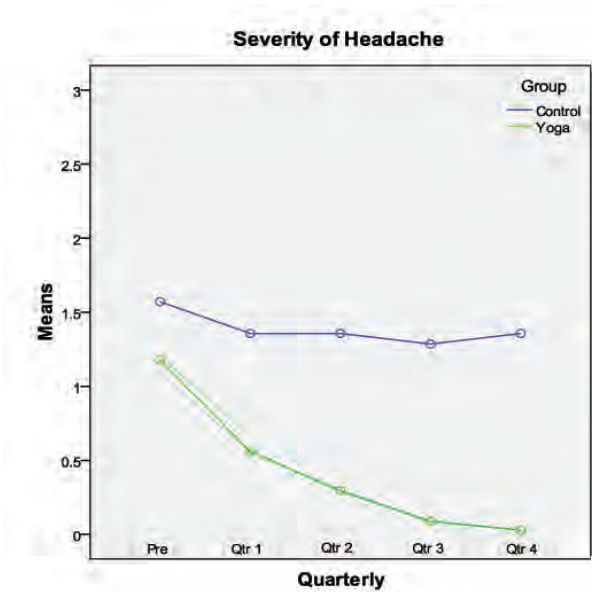


Table 4: Hypertension – descriptive statistics for headache

	Control (n=14)		Yoga (n=34)	
	Mean	Std dev	Mean	Std dev
Pre (mth 1)	1.57	0.852	1.18	1.218
Qtr 1 (mth 4)	1.36	0.633	0.56	0.746
Qtr 2 (mth 7)	1.36	0.929	0.29	0.524
Qtr 3 (mth 10)	1.29	1.069	0.09	0.288
Qtr 4 (mth 13)	1.36	1.082	0.03	0.171



Incidence & Severity of Headache

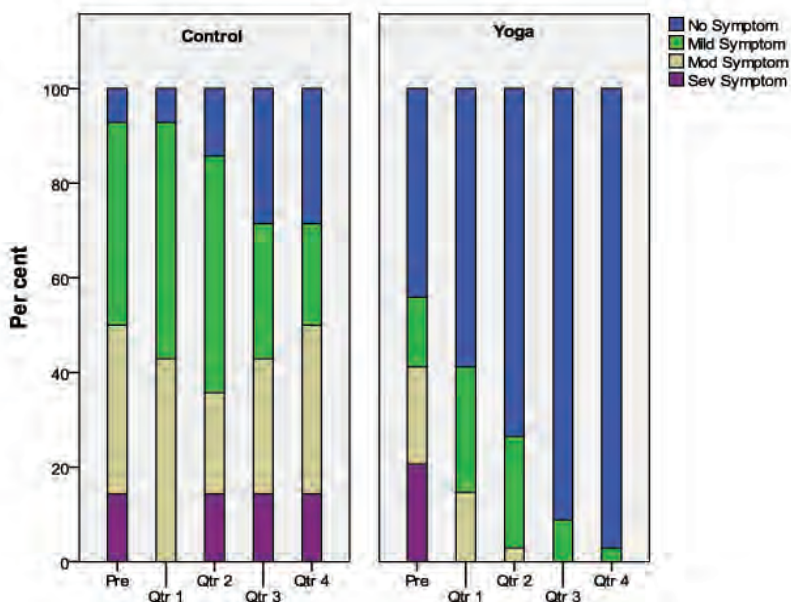
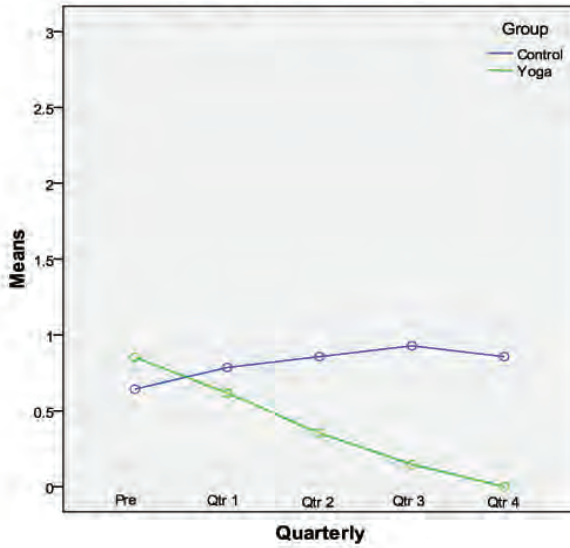


Table 5: Hypertension – descriptive statistics for heaviness in chest

	Control (n=14)		Yoga (n=34)	
	Mean	Std dev	Mean	Std dev
<i>Pre (mth 1)</i>	0.64	1.008	0.85	0.958
<i>Qtr 1 (mth 4)</i>	0.79	0.893	0.62	0.697
<i>Qtr 2 (mth 7)</i>	0.86	0.864	0.35	0.597
<i>Qtr 3 (mth 10)</i>	0.93	0.829	0.15	0.359
<i>Qtr 4 (mth 13)</i>	0.86	0.770	0.00	0.000

Severity of Heaviness in Chest



Incidence & Severity of Heaviness in Chest

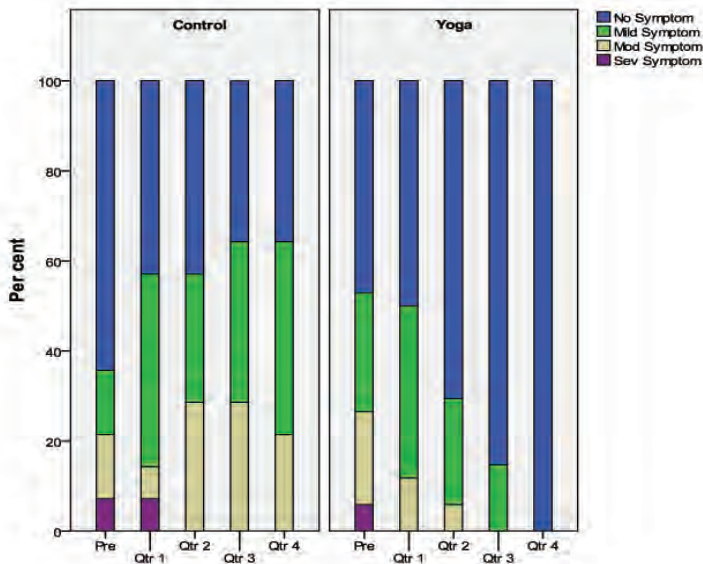
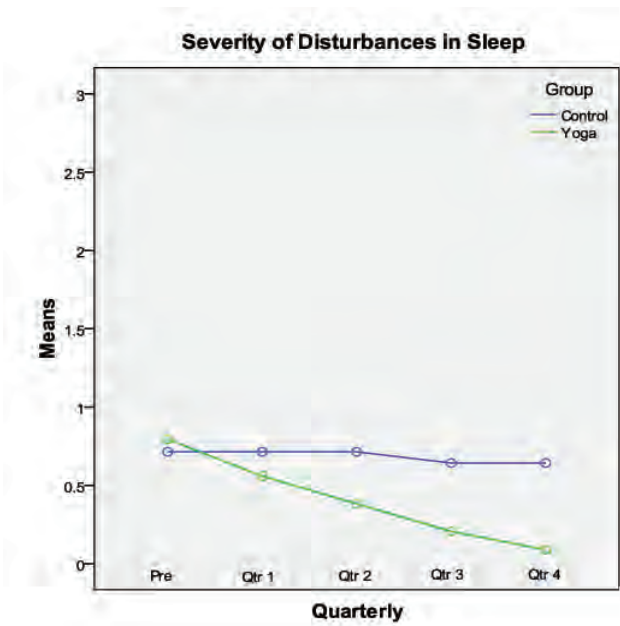


Table 6: Hypertension – descriptive statistics for disturbance in sleep

	Control (n=14)		Yoga (n=34)	
	Mean	Std dev	Mean	Std dev
Pre (mth 1)	0.71	1.139	0.79	1.067
Qtr 1 (mth 4)	0.71	1.139	0.56	0.991
Qtr 2 (mth 7)	0.71	1.139	0.38	0.739
Qtr 3 (mth 10)	0.64	1.008	0.21	0.410
Qtr 4 (mth 13)	0.64	1.008	0.09	0.288



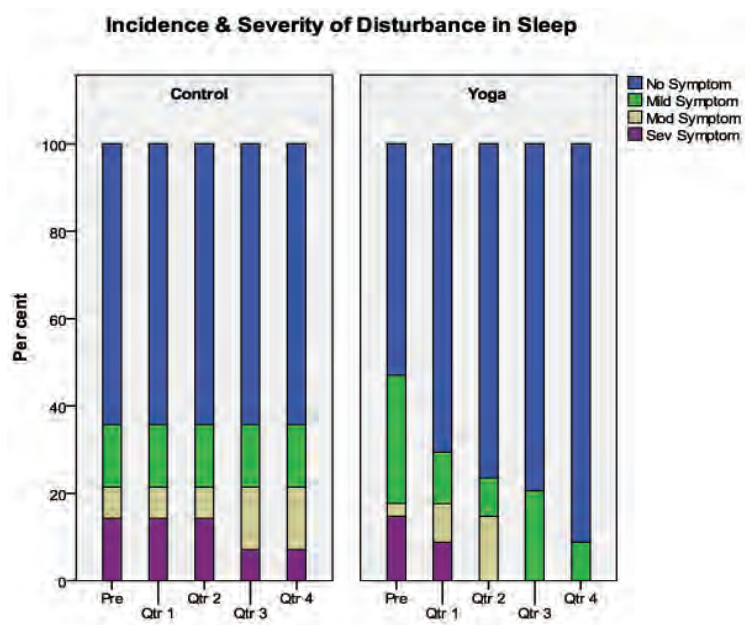


Table 7: Hypertension – descriptive statistics for breathlessness

	Control (n=14)		Yoga (n=34)	
	Mean	Std dev	Mean	Std dev
Pre (mth 1)	0.64	0.75	1.12	1.07
Qtr 1 (mth 4)	0.79	0.89	0.71	0.80
Qtr 2 (mth 7)	0.86	0.95	0.47	0.51
Qtr 3 (mth 10)	0.71	0.91	0.09	0.29
Qtr 4 (mth 13)	0.64	0.84	0.03	0.17

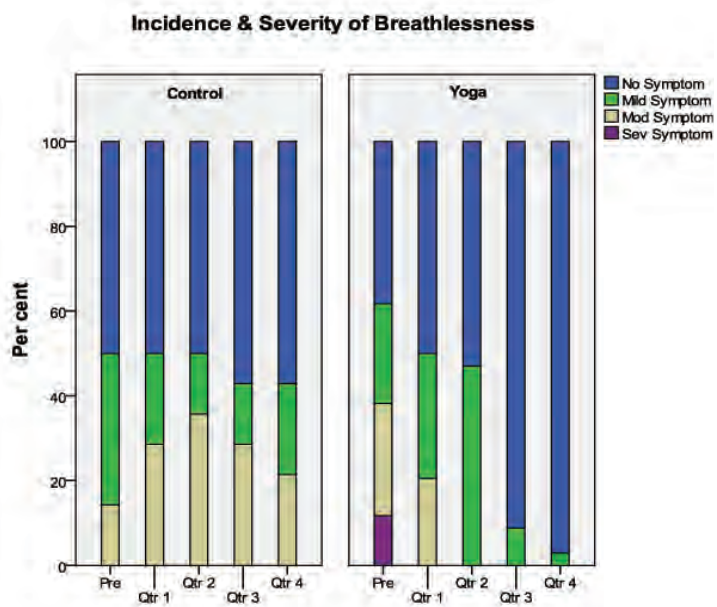
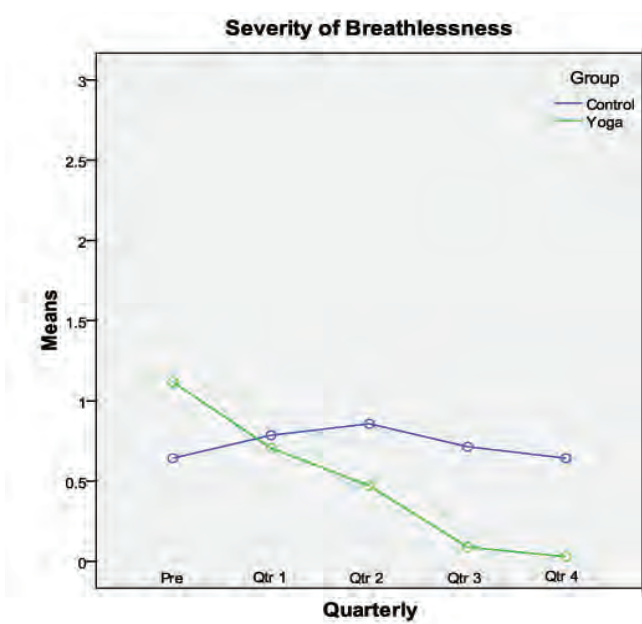
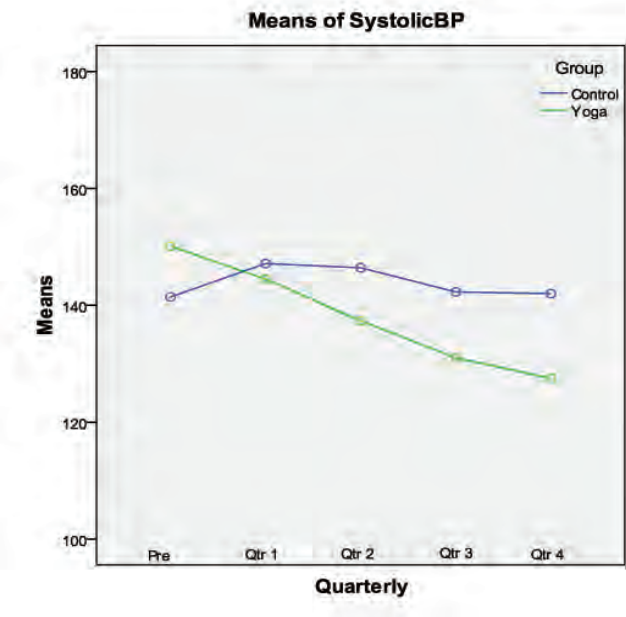


Table 8: Hypertension – descriptive statistics for systolic blood pressure

Group		Mean	Std dev	25 percentile	50 percentile	75 percentile
Control (n=14)	Pre (mth 1)	141.43	10.995	130.00	140.00	150.00
	Qtr 1 (mth 4)	147.14	14.899	140.00	140.00	160.00
	Qtr 2 (mth 7)	146.43	12.774	140.00	145.00	160.00
	Qtr 3 (mth 10)	142.29	11.062	140.00	140.00	150.00
	Qtr 4 (mth 13)	142.00	12.329	140.00	140.00	144.00
Yoga (n=34)	Pre (mth 1)	150.12	16.819	140.00	150.00	160.00
	Qtr 1 (mth 4)	144.47	14.598	130.00	140.00	160.00
	Qtr 2 (mth 7)	137.35	13.993	130.00	135.00	140.00
	Qtr 3 (mth 10)	131.00	8.672	130.00	130.00	130.00
	Qtr 4 (mth 13)	127.53	6.788	124.00	130.00	130.00



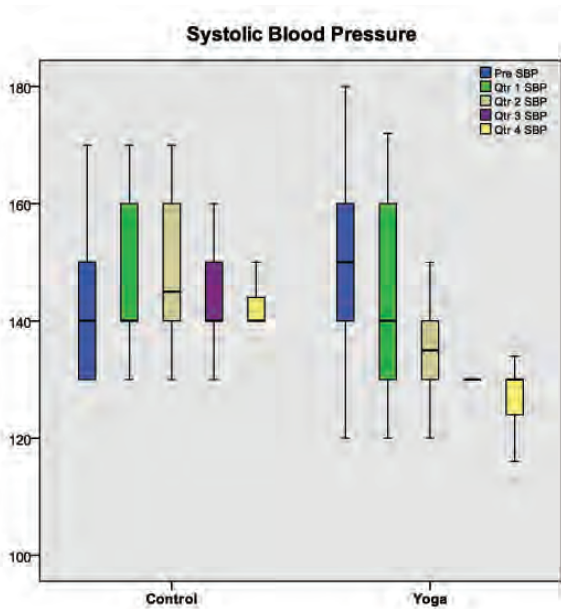


Table 9: Hypertension – descriptive statistics for diastolic blood pressure

Group		Mean	Std dev	25 percentile	50 percentile	75 percentile
Control (n=14)	<i>Pre (mth 1)</i>	90.71	9.169	80.00	90.00	100.00
	<i>Qtr 1 (mth 4)</i>	88.71	11.861	80.00	90.00	96.00
	<i>Qtr 2 (mth 7)</i>	90.71	6.157	90.00	90.00	90.00
	<i>Qtr 3 (mth 10)</i>	87.57	7.366	80.00	88.00	90.00
	<i>Qtr 4 (mth 13)</i>	90.14	5.347	90.00	90.00	90.00
Yoga (n=34)	<i>Pre (mth 1)</i>	94.41	9.506	90.00	95.00	100.00
	<i>Qtr 1 (mth 4)</i>	86.29	10.294	80.00	90.00	90.00
	<i>Qtr 2 (mth 7)</i>	83.82	6.038	80.00	80.00	90.00
	<i>Qtr 3 (mth 10)</i>	80.35	7.261	80.00	80.00	80.00
	<i>Qtr 4 (mth 13)</i>	82.24	4.370	80.00	80.00	84.00

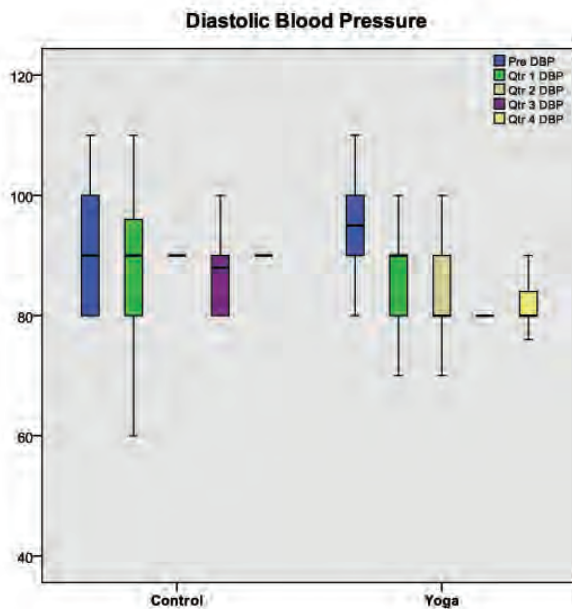
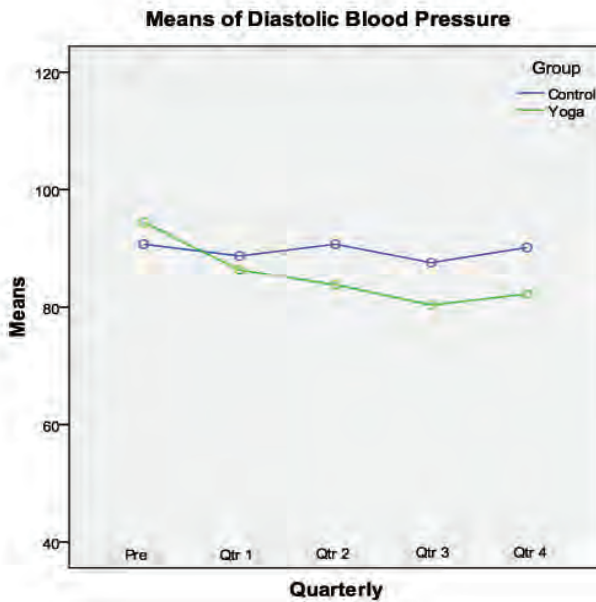
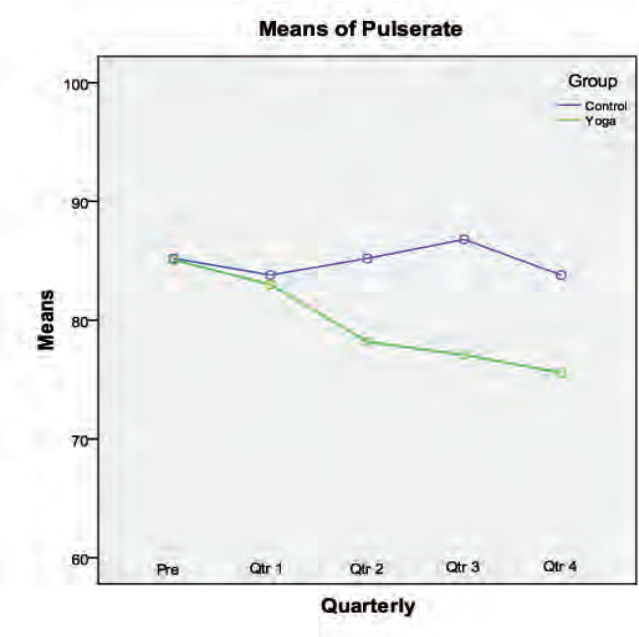


Table 10: Hypertension – descriptive statistics for pulse-rate

Group		Mean	Std dev	25 percentile	50 percentile	75 percentile
Control (n=14)	<i>Pre (mth 1)</i>	85.20	3.425	84.00	86.00	88.00
	<i>Qtr 1 (mth 4)</i>	83.80	4.756	82.00	84.00	88.00
	<i>Qtr 2 (mth 7)</i>	85.20	5.594	82.00	84.00	88.00
	<i>Qtr 3 (mth 10)</i>	86.80	6.812	82.00	85.00	92.00
	<i>Qtr 4 (mth 13)</i>	83.80	6.893	80.00	81.00	90.00
Yoga (n=34)	<i>Pre (mth 1)</i>	85.07	7.591	80.00	84.00	88.00
	<i>Qtr 1 (mth 4)</i>	83.00	6.122	79.00	84.00	87.00
	<i>Qtr 2 (mth 7)</i>	78.18	6.700	73.00	78.00	82.00
	<i>Qtr 3 (mth 10)</i>	77.07	6.049	72.00	76.00	81.00
	<i>Qtr 4 (mth 13)</i>	75.57	6.540	72.00	76.00	80.00



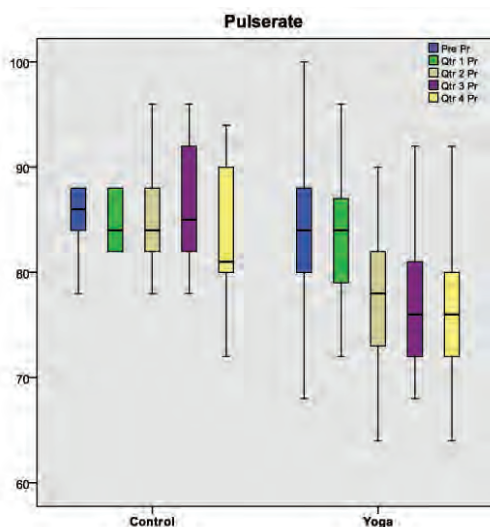


Table 11: Hypertension – descriptive statistics for BMI and W:H

		Basal Metabolic Index		Waist:Hip circumference	
Group		Mean	Std dev	Mean	Std dev
Control (n=14)	<i>Pre (mth 1)</i>	23.32	3.307	0.93	0.035
	<i>Qtr 1 (mth 4)</i>	23.50	3.312	0.93	0.036
	<i>Qtr 2 (mth 7)</i>	23.59	3.284	0.93	0.031
	<i>Qtr 3 (mth 10)</i>	23.71	3.317	0.93	0.034
	<i>Qtr 4 (mth 13)</i>	23.85	3.187	0.94	0.032
Yoga (n=34)	<i>Pre (mth 1)</i>	24.83	3.835	0.94	0.066
	<i>Qtr 1 (mth 4)</i>	24.87	3.874	0.94	0.064
	<i>Qtr 2 (mth 7)</i>	24.53	3.962	0.95	0.064
	<i>Qtr 3 (mth 10)</i>	24.19	4.143	0.95	0.066
	<i>Qtr 4 (mth 13)</i>	24.10	3.956	0.94	0.062

Table 12: Hypertension – change in medication dosage

	Control	Yoga
<i>Total (n)</i>	14	34
<i>New drug added</i>	4 (28.57 %)	1 (2.94%)
<i>Dose increased</i>	1 (7.14 %)	1 (2.94%)
<i>No change</i>	9 (64.29 %)	13 (38.24%)
<i>Dose/no. of drugs reduced</i>	0 (0 %)	13 (38.24%)
<i>All drugs stopped</i>	0 (0 %)	4 (11.76%)
<i>Data not available</i>	0 (0 %)	2 (5.88%)

Table 13: Hypertension – descriptive statistics for medication dosage

Group		Mean	Std dev	25 percentile	50 percentile	75 percentile
Control (n=14)	<i>Pre (mth 1)</i>	2.82	1.514	2.00	2.50	4.00
	<i>Qtr 1 (mth 4)</i>	2.82	1.462	2.00	3.00	4.00
	<i>Qtr 2 (mth 7)</i>	3.00	1.569	2.00	3.00	4.00
	<i>Qtr 3 (mth 10)</i>	3.00	1.569	2.00	3.00	4.00
	<i>Qtr 4 (mth 13)</i>	3.21	1.847	2.00	3.00	5.00
Yoga (n=34)	<i>Pre (mth 1)</i>	2.64	1.618	1.00	2.25	4.00
	<i>Qtr 1 (mth 4)</i>	2.58	1.592	1.00	2.00	3.75
	<i>Qtr 2 (mth 7)</i>	2.44	1.831	1.00	2.00	3.00
	<i>Qtr 3 (mth 10)</i>	2.05	1.752	1.00	2.00	2.50
	<i>Qtr 4 (mth 13)</i>	1.98	1.762	1.00	1.25	2.25

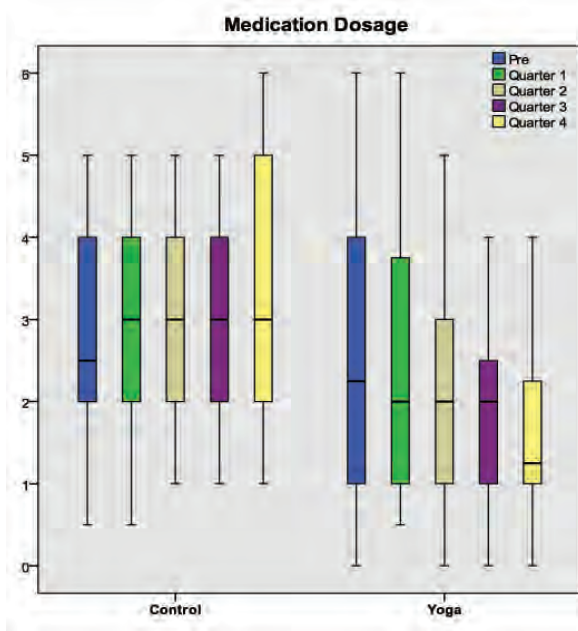
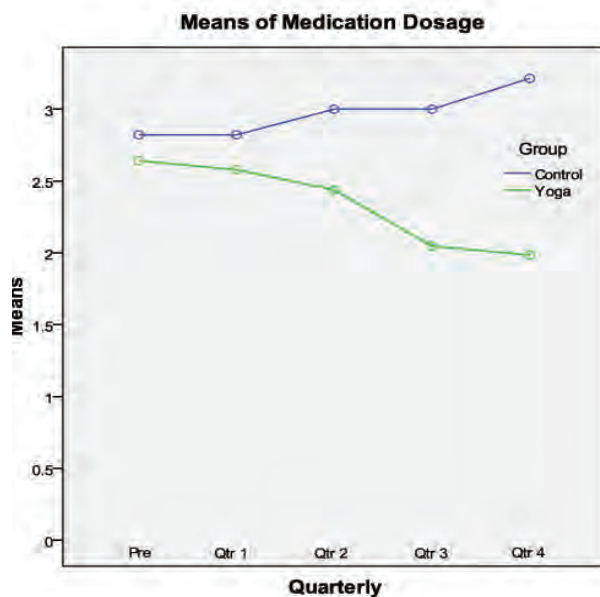


Table 14: Hypertension – multivariate tests (quarterly* group; Wilks' Lambda)

	F *	df	Significance	Eta square **	Power^b ***
<i>Dizziness</i>	3.527a	4,43	0.014	0.247	0.825
<i>Feeling unwell</i>	11.690a	4,43	0.000	0.521	1.000
<i>Headache</i>	1.498a	4,43	0.220	0.122	0.424
<i>Heaviness in chest</i>	3.985a	4,43	0.008	0.270	0.874
<i>Sleep disturbances</i>	2.053a	4,43	0.104	0.160	0.564
<i>Breathlessness</i>	4.151a	4,43	0.006	0.279	0.888
<i>Systolic BP</i>	8.201a	4,43	0.000	0.433	0.997
<i>Diastolic BP</i>	4.559a	4,43	0.004	0.298	0.918
<i>Pulse-rate</i>	5.757a	4,33	0.001	0.411	0.963
<i>BMI</i>	3.352a	4,39	0.019	0.256	0.798
<i>W:H circumference</i>	1.103a	4,40	0.368	0.099	0.315
<i>Medication dosage</i>	3.552a	4,41	0.014	0.257	0.826

a. Exact statistic
b. Computed using alpha = 0.05

Explanatory note

*F statistic: When two readings are compared for a parameter the null hypothesis is tested using Student's t test. But when repeated readings are taken over a period of time for a parameter in a group of subjects the null hypothesis cannot be tested using t test, instead F statistic is used. It is the t test for analysis of variance. The cut-off value of F statistic at which null hypothesis is rejected depends on the degree of freedom and after computation is expressed as significance.

****Effect size:** Many times the resultant change found in an experiment is statistically significant but in practice it may be of no significance. This especially happens when the group is very large. A change in systolic BP by 2 mmHg in a group of 2000 subjects may be statistically significant but has no meaning in practice. The 'Effect size' is a measure of the degree to which variability among observations can be attributed to treatments. We have used 'Eta square' to express effect size. The higher the value the more relevant is the result. A value greater than 0.2 is considered acceptable.

*****Power:** It represents the probability of correctly rejecting a false null hypothesis. In simple words it expresses the reliability of the findings. The value 1 shows 100% reliability, 0.5 shows 50% probability.

HYPERTENSION – TEACHING SCHEDULE (BHEL)

Class structure

Shanti mantras	5 (5) minutes
Shavasana	5 (4) minutes
Asana	25 (22) minutes
Talk	10 (0) minutes
Questions	5 (0) minutes
Pranayama	15 (12) minutes
Meditation	15 (12) minutes
Questions	5 (0) minutes
Shanti mantras	5 (5) minutes

Asanas will be repeated at least on 3 consecutive days. Only one or two new practices may be introduced on any day. Only one pranayama will be introduced in a day. At least two pranyamas will be revised every day.

Schedule

Practices of previous week/s need to be revised in all subsequent weeks.

Week 1: PM I – omit neck rotation in greeva sanchalanasana

Tadasana

Tiryak tadasana

Kati chakrasana

Vajrasana

Shavasana

Breath awareness

Abdominal and yogic breathing

Kaya sthairyam with *Om* chanting

Week 2: PM II (half of the practices) – omit jhulana

lurhakanasana & naukasana

Matsya kridasana

Makarasana

Padadhirasana
 Nadi shodhana pranayama stage 1
 Hridaya mudra
 Yoga nidra stages 1, 3, 4 and 8
 Jala neti
Week 3: PM II (complete) – omit jhulana lurhakanasana & naukasana
 Hasta utthanasana
 Ardha shalabhasana
 Swastikasana
 Nadi shodhana pranayama stage II (alternate nostril breathing)
 Bhramari pranayama
 Sheetali & sheetkari pranayama
 Yoga nidra stages 1, 2, 3, 4, 7 and 8
 Antar mouna stage I
Week 4: Chakki chalanasana
 Nauka sanchalanasana
 Siddha/siddha yoni asana
 Ardha padmasana
 Nadi shodhana pranayama stage II (counting the duration of breath)
 Yoga nidra stages 1, 2, 3, 4, 6, 7 and 8
 Om chanting with awareness at anahata chakra
Week 5: Marjariasana
 Sphinx asana
 Bhujangasana
 Nadi shodhana pranayama stage II (equalizing inhalation & exhalation)
 Prana mudra
 Antar mouna stage II
Week 6: Ujjayi pranayama
Week 7: Nadi shodhana pranayama stage II (lengthening the breath)
 Ajapa japa in frontal passage
Week 8: Eka pada pranamasana

Encourage regularity in yogic practices and also in yogic principles that were recommended in the class. Find out what are their difficulties and help them to solve them.

Acknowledgements

We could undertake such a long study only with
the blessings and inspiring force of our guru Parama-
hansa Swami Niranjanananda,
the broad, unconventional & progressive vision of then
E.D. of BHEL, Bhopal, Shri P.T. Deo,
the dynamism & support of then President of HE Yoga
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Amaresh Kumar and Smt Pratima Prasad,
and the sincerity and regularity of all our participants.

RESEARCH STUDY: EFFECT OF SATYANANDA YOGA ON HYPERTENSION – SUMMARY REPORT

Method

- 34 subjects in the experimental group practised Satyananda Yoga for 6–12 months. They continued with their medication. See Appendix 1 for yoga practices.
- 14 subjects in the control group continued with their medication.
- Both the groups were followed every month for 12 months for the following parameters.
- Parameters:
 1. Symptoms of dizziness, feeling unwell, headache, heaviness in chest, disturbances in sleep and shortness of breath
 2. Clinical observations of systolic and diastolic blood pressure, pulse-rate, Basal Metabolic Index (BMI), ratio of waist to hip circumference and ophthalmic funduscopy for hypertensive retinopathy
 3. Medication for hypertension

Results

1. Symptoms:

Incidence of symptoms – pre and in last three months

Symptom	Yoga group	Control group
<i>Dizziness</i>	53% to 0–3%	57% to 50%
<i>Feeling unwell</i>	94% to 3–6%	78% to 86%
<i>Headache</i>	56% to 3%	93% to 71%
<i>Heaviness in chest</i>	53% to 0%	36% to 64%
<i>Disturbance in sleep</i>	47% to 9–18%	36% all through
<i>Breathlessness</i>	62% to 3%	50% to 43%

Means of severity of symptoms – pre and in last month

Symptom	Yoga group	Control group	F, (significance), power
<i>Dizziness</i>	0.91 to 0.00	0.79 to 0.86	3.527, (0.014), 0.825
<i>Feeling unwell</i>	1.74 to 0.03	1.00 to 1.14	11.690, (0.000), 1.000
<i>Headache</i>	1.18 to 0.03	1.57 to 1.36	1.498, (0.220), 0.424
<i>Heaviness in chest</i>	0.85 to 0.00	0.64 to 0.86	3.985, (0.008), 0.874
<i>Disturbance in sleep</i>	0.79 to 0.09	0.71 to 0.64	2.053, (0.104), 0.564
<i>Breathlessness</i>	1.12 to 0.03	0.64 to 0.64	4.151, (0.006), 0.888

2. Clinical observations:

Means of clinical observations – pre and in last month

Symptom	Yoga group	Control group	F, (significance), power
<i>Systolic BP</i>	150.12 to 127.53	141.43 to 142	8.201, (0.000), 0.997
<i>Diastolic BP</i>	94.41 to 82.24	90.71 to 90.14	4.559, (0.004), 0.918
<i>Pulse-rate</i>	85.07 to 75.57	85.20 to 83.80	5.757, (0.001), 0.963
<i>BMI</i>	24.83 to 24.10	23.32 to 23.85	3.352, (0.019), 0.798
<i>W:H circumference</i>	0.94 to 0.94	0.93 to 0.94	1.103, (0.368), 0.315

3. Medication:

Means of medication dosage – pre and in last month

Symptom	Yoga group	Control group	F, (significance), power
Medication dosage	2.64 to 1.98	2.82 to 3.21	3.552, (0.014), 0.826

Change in medication dosage

	Yoga	Control
Total (n)	34	14
New drug added	1 (2.94 %)	4 (28.57 %)
Dose increased	1 (2.94 %)	1 (7.14 %)
No change	13 (38.24 %)	9 (64.29 %)
Dose/no. of drugs reduced	13 (38.24 %)	0 (0 %)
All drugs stopped	4 (11.76 %)	0 (0 %)
Data not available	2 (5.88 %)	0 (0 %)

Conclusion

The yoga group showed highly significant improvement in:

- Systolic BP, diastolic BP & pulse-rate
- Antihypertensive medication dosage
- Symptoms of breathlessness, dizziness, feeling unwell, & heaviness in chest and **clinically significant** improvement in headache & disturbance in sleep, and
- Significant change in BMI

Not much change in:

- Waist/hip circumference
- Hypertensive retinopathy.

Yoga and Asthma

When one suffers from asthma it appears that it is a disease of the respiratory system; either respiratory congestion or the inability to inhale to capacity. The attitude of yoga, however, is to look more deeply for the source of the problem: the centre which controls respiration is situated in the brain.

If shatkarmas and pranayamas are practised one can be rid of asthma, but that is not a cure, it is treatment. Final cure takes place when one has been able to go into that centre in the brain and reset the disharmony or the defect causing the misbehaviour of that centre.

Kindly remember that the root cause of asthma is upset of a mechanism, breakdown of a mechanism in the higher centres in the brain, which is reflected in the respiratory system.

Asthma can be completely eradicated by the practice of yoga and hatha yoga. There are certain practices which prevent asthma attacks, and others for use at the time of an asthma attack. A few practices are particularly useful.

When there is a feeling that some respiratory congestion is taking place and an asthma attack is coming, shashankasana must be practised. Remain there as long as possible; there is no time restriction. Ten minutes, twenty, half an hour, one hour; if it cannot be held for some time, then return to the upright position for a while. Repeat the

practice. If the nose gets blocked, sit up, then when the nose is clear, practise it again. This will stimulate the adrenal glands. It is not treatment, it is not cure, it is to avert the asthma attack.

—*Swami Satyananda Saraswati*

Research 4: Effect of Satyananda Yoga on Asthma and COPD

Research Report on Asthma, 2006–2007

Dr Swami Nirmalananda Saraswati (Yoga Research Foundation, Munger, Bihar, India)

Dr Mrs Alpana Tiwari, (Dept. of Medicine, Kasturba Hospital, BHEL, Bhopal, India)

Summary

The efficacy of yoga as practised in the Satyananda Yoga tradition was studied as a complementary treatment in people in the higher age group (mean 55.8 years) with long-standing asthma and Chronic Obstructive Pulmonary Disease (COPD) (mean 12.4 years) in a controlled progressive trial. Twenty subjects in the yoga group and 21 in the control group were studied using symptoms, objective clinical observations, spirometry and medication as parameters observed over a period of 12 months (February 2006 to February 2007). We found relief in symptoms, improvement in breath holding time and reduction in use of medication. The spirometry tests showed improvement in Forced Expiratory Volume in first second (FEV1) and Forced Vital Capacity (FVC). The study concluded that Satyananda Yoga is helpful in management of long-standing asthma and COPD.

Introduction

Asthma is a chronic inflammatory condition of the lungs characterized by reversible airflow obstruction. It affects over 100 million people worldwide and its prevalence is increasing. This is likely due to increased exposure to indoor and outdoor pollutants or allergens and may also be due to a changing microbiological environment that impacts the immune system. Long-standing asthma results

in Chronic Obstructive Pulmonary Disease (COPD). COPD is a broad and relatively non-specific term that is applied to a spectrum of diseases that include chronic bronchitis, emphysema and asthmatic bronchitis. It is a slowly progressive disorder characterized by airflow obstruction that is not fully reversible. Both asthma and COPD exert a significant morbidity and mortality burden on patients, employers and society. In a study by ICMR in India, the overall prevalence of asthma was reported to be 2.4% and that of COPD, in the population of age over 30 years, 4.1%. It is an enormous national burden.

Yoga has potential to benefit patients with asthma and COPD but too few studies have been carried out, especially in patients with long history of these diseases, to warrant a firm judgment. All the previous studies, done mainly on asthmatics with relatively short history of the disease, found yoga as an effective adjunct to mainstream medicine in reducing symptoms and medicine requirements and clinical parameters like breath holding time (BHT) and peak expiratory flow rate (PEFR), but only two studies found it to actually improve pulmonary function tests of spirometry.

Need for the present study

The efficacy of yoga as a complementary therapy for the management of asthma has been established beyond doubt. We, at Yoga Research Foundation and Bihar School of Yoga, Munger, Bihar, India, in collaboration with Yoga Research Center and Kasturba Hospital managed by BHEL in Bhopal, India, still decided to undertake the present study because:

1. Nobody has studied the effect of yogic practices on asthmatics with long history of the disease (over 5 years) and only one study has been undertaken on subjects with established COPD.
2. Most of the studies observe the effect of yoga practices over short duration and hence the seasonal variation in the course of the disease cannot be ruled out.

3. The system of Satyananda Yoga is a unique system of yoga. Its effect on asthma has not been scientifically studied on Indian subjects.
4. Saving on expenditure of drugs due to yoga therapy has never been studied before.

The effect on financial load, human productivity and the quality of life, though planned, could not be studied in the current study due to the inability to collect authentic data.

Hypothesis

In the subjects with asthma of duration more than 5 years and/or COPD, regular practice of Satyananda Yoga:

1. Reduces the symptoms
2. Improves breath holding time (BHT) and peak expiratory flow rate (PEFR)
3. Improves pulmonary functions: Forced Expiratory Volume in first second (FEV1), Forced Vital Capacity (FVC), the ratio of the two (FEV1/FVC) and Maximal Expiratory Flow Rate (MEFR)
4. Reduces medication dosage

Research design

- Open controlled trial with repeated measures, allocation of group by subject's choice.
- Statistical analysis was done using SPSS 17 software:
 1. F statistics using General linear Model, Repeated measures – to establish significance of change in variables within the group, to reject null hypothesis
 2. Descriptive study (mean and percentile) – to quantify the change in parameters
 3. Distribution of severity of symptoms in terms of percentage of subjects

METHOD

A. Selection criteria

Inclusion criteria:

- BHEL employees/retired employees and their dependent family members who are eligible for medical facility at BHEL-run Kasturba Hospital, Bhopal, having history of asthma for over 5 years and/or COPD
- Adult male and female below the age of 70 years with no other major medical condition except hypertension
- Willing to participate in the study

Exclusion criteria:

- Attendance in yoga class less than 25% throughout the study
- Monthly follow-up less than six times throughout the study

B. Parameters

- Symptoms: pre & once a month for 12 months
Cough
Breathlessness
Quality of sleep
Tightness in chest
Wheeze
- Objective Clinical Observations: pre & once a month for 12 months
Breath Holding Time (BHT)
Peak Expiratory Flow Rate (PEFR)
- Spirometry: pre, mid and post
- Use of medication: pre & once a month for 12 months

C. Procedure of study

The patients diagnosed with asthma of over 5 years duration and/or COPD and of age not more than 70 years, attending the chest OPD at Kasturba Hospital, BHEL, Bhopal, were informed about the research study. Those who were willing to participate were screened for major medical disorders. On

fulfilment of selection criteria and after informed consent they were allocated to either control or experimental group on their own choice. If it was convenient for them to attend yoga classes daily over one year they were recruited in the yoga or the experimental group; if not, then in the control group. Both the groups continued medical treatment as advised by the researching doctor at Kasturba Hospital, BHEL, Bhopal. The experimental group, in addition, practised yoga at Yoga Research Center, BHEL, Bhopal, under supervision of Bihar School of Yoga and Yoga Research Foundation, Munger, for one hour 6 days a week for one year. 25 subjects were recruited in each group, but 5 in the yoga group and 4 in the control group disqualified during the study leaving 20 subjects in the yoga and 21 in the control group. The study lasted from February 2006 to February 2007.

Independent variable: The experimental group practised selected asanas, pranayamas, yoga nidra and other pratyahara and dharana practices daily. In addition they practised hatha yoga's cleansing practices known as shatkarma periodically. It included jala neti, kunjla kriya and laghoo shankhaprakshalana. They also practised mantra and kirtan (devotional singing) periodically. See Appendix 1 for details. They were addressed on various yogic concepts like yogic lifestyle, mantra, bhakti, seva etc. An attendance register was maintained to observe their regularity. Both the groups continued their medication as suggested by their doctors and every month they came for followup.

On recruitment of a subject basic biodata and clinical history were collected and clinical evaluation and basic laboratory tests were carried out. The following parameters were recorded for both the groups. The study was concluded after 12 months.

I. Symptoms measured pre & once a month

1. Cough (0–3 grades)
2. Dyspnoea (0–3 grades)

3. Quality of sleep (0–3 grades)
4. Tightness in chest (absent or present)
5. Wheeze (absent or present)

Five symptoms were studied by asking direct questions to the subjects. The data was recorded in the beginning and subsequently every month during the follow-up visits. The first three symptoms of cough, breathlessness and disturbances in sleep were recorded in zero to 3 grades where zero meant no symptoms, grade 1 mild, grade 2 moderate and grade 3 severe symptoms. The symptoms of tightness in chest and wheeze were recorded as either absent or present.

II. Objective clinical observations measured pre & once a month:

1. Breath holding time (BHT), in seconds
2. Peak expiratory flow rate (PEFR), in litres per minute, using peak-flow meter

III. Spirometry measured pre, mid & post:

1. Forced expiratory volume in first second (FEV1), in % of normal predicted value
2. Forced vital capacity (FVC), in % of normal predicted value
3. Ratio FEV1/FVC, in % of normal predicted value
4. Maximal expiratory flow rate (MEFR), in % of normal predicted value

Spirometry or Pulmonary function test (PFT) was done in the beginning (pre), after 6 months (mid) and at the end (post). FEV1, FVC, FEV1/FVC and MEFR were recorded each time.

IV. Medication measured pre & once a month:

1. Main bronchodilator, daily dose
2. Additional bronchodilator (if any), daily dose
3. Systemic corticosteroids (if any), daily dose & for how long
4. Anti-allergy (if any), daily dose
5. Antibiotics (if any), daily dose & for how long

The data was analyzed for descriptive statistic & F statistic and relevant graphs were plotted using SPSS 17 software.

RESULTS & DISCUSSION

A. Characteristics of the sample

There were 20 subjects in the yoga group and 21 in the control group. Table 1 shows the comparative characteristics of the yoga and control groups.

Table 1: Asthma – characteristics of the sample

	Control	Yoga
<i>No. of subjects</i>	21	20
<i>Age in years – mean (range)</i>	57.84 (37–71)	52.37 (35–68)
<i>Gender – F/M</i>	18 F/3 M	7 F/13 M
<i>Duration of asthma in years – mean (range)</i>	11.25 (1–50)	13.15 (4–35)
<i>Family history of asthma</i>	9	9
<i>Family history of other allergic conditions</i>	3	11
<i>Attendance in yoga class – mean (range)</i>	Not applicable	59.90% (31.61–90.12%)

The yoga group and the control group were not completely matching with each other. The ratio of men to women was opposite between the two groups. As a result, the incidence of smoking and work-related stress was greater in the yoga group. The family history of allergic conditions was found to be very high in the yoga group.

It was observed that amongst the yoga group, people having attendance above 45% had more men and more work stress. Also, the age, duration of illness and unhappiness in life were higher in that sub-group. The incidence of smoking and family history of asthma was the same. To summarize, the high risk subjects practised yoga more regularly. These two opposing forces have diluted the outcome.

B. Symptoms

Occurrence and severity of each symptom was recorded every month on follow-up visits. This gave an idea of seasonal response in both groups. For the simplicity of statistical calculations and presentations, only quarterly data at month 1 or pre, month 4 or quarter 1, month 7 or quarter 2, month 10 or quarter 3 and month 13 or quarter 4 were used. Both groups showed improvement in the incidence and the severity of all the symptoms in the first three months due to the weather warming up from February to May. The yoga group maintained this improvement throughout the year, while the control group reverted back to its severity of symptoms.

The line graphs show the variation of intensity of the symptoms with time. The declining line graph, usually found in the yoga group, indicates steady improvement with time. Generally, the control group showed a line that is more or less level or inclined upwards, showing no change, or deterioration. The stacked bar graphs show the proportion of subjects having no, mild, moderate or severe symptoms at five selected time periods in both groups, separately. Each sub-group of symptom severity is represented in percentage by its colour code within the bar.

Both groups showed seasonal improvement in the incidence and severity of symptom of **cough** in the first quarter. The yoga group showed continued improvement while the control group experienced similar or slightly more symptom of cough in damp, cold and pollen-rich seasons. The number of symptom-free subjects increased in the yoga group over the time (see Tables 2 and 3 and the accompanying graphs). The clinical improvement found in the yoga group is however statistically insignificant ($P\ 0.405$) in comparison to the control group (see Table 20).

The symptom of cough is very common in asthmatics. It is due to oversensitive mucosa producing inflammatory reaction, or due to ineffective process. Failure to scavenge the secretions promptly and adequately leads to the symptom

of cough. Yogic postures, cleansing practices and breathing practices help the body to get rid of respiratory secretions efficiently and quickly, reducing the symptom of cough. Also lack of collected secretion reduces the chance of infection. All the practices of yoga including mantra, meditation and devotional singing generate a sense of wellbeing which in turn improves the functioning of the immune system. The allergic inflammatory response and proneness to infection are thereby reduced to some extent.

Both the groups showed seasonal improvement in the incidence and the severity of symptom of **dyspnoea** or **breathlessness** in first quarter, month of May, and deterioration in second quarter, month of August. The yoga group showed continued improvement in last two quarters, months of November and February while the control group experienced mild increase in the severity of the symptom though the incidence had decreased. The number of symptom-free subjects increased over the time in both groups (see Tables 4 and 5 and the accompanying graphs). The clinical improvement found in the yoga group is however statistically insignificant ($P\ 0.137$) in comparison to the control group (see Table 20).

Breathlessness is the cardinal symptom of asthma. It is due to narrowing of bronchioles causing increased effort in exhalation. In more advanced cases (COPD) closure of bronchioles midway during the act of exhalation causes trapping of air and incomplete exhalation. The next inhalation is shallow because of the retained air from the previous breath. Retention of air builds up gradually leading to breathlessness. Slow and deep breathing during yogic postures and breathing practices, as well as a relaxed mind with a sense of wellbeing convert turbulent airflow of breathing in an asthmatic into a laminar flow. Premature airway closure and air trapping are minimized and breathing becomes more cost effective in terms of effort required in breathing leading to relief of breathlessness. The distressing effects of yoga may also relax the bronchioles to

some extent by changing the endogenous chemicals. It is evident from Tables 4 and 5 and the accompanying graphs that the occurrence of symptom was similar in both groups but in the control group, the severity was more and spread out over a wider period. The yoga group showed a distinct seasonal variation: more breathlessness in winter months and at time of high levels of pollens. This means that the allergic response occurs as frequently but its magnitude and/or the air trapping is reduced.

Both groups showed improvement in the **quality of sleep** in the first quarter. When health is disturbed at the physical or psychological level, sleep usually is disturbed. Sound sleep is an indirect measure of good health. As their other symptoms receded, the subjects were able to sleep well. The yoga group had more subjects with sleep disturbances to begin with but showed dramatic change in the quality of sleep throughout the study period. The control group on the other hand reverted back to the same or even slightly worse sleep disturbances after initial improvement (see Tables 6 and 7 and the accompanying graphs). Clinically, very significant improvement is not reflected in statistic calculations. Statistically, it is insignificant improvement in comparison to the control group, with a P value of 0.255 (see Table 20).

The symptom of **tightness in chest** was scored only as present or absent; its severity was not scored. In the yoga group it remained more or less same throughout, and in the control group it increased to some extent in the 2nd, 3rd and 4th quarters. See Tables 8 and 9 and the accompanying graphs. There was no statistically significant change in this symptom in comparison to the control group (P 0.826) (see Table 20).

The symptom of **wheeze** was also scored as either present or absent. There was little improvement in both groups in the first quarter, followed by the slight trend towards deterioration (see Tables 10 and 11). The changes were statistically insignificant in comparison to the control group (P 0.364) (see Table 20).

Tightness in chest and wheezing occur due to resistance to breathing. Yogic practices release stress and also establish smooth laminar airflow by quiet, deep breathing. The bronchioles relax and the resistance to airflow decreases, relieving tightness in chest and wheezing.

The improvement in symptoms found was useful and substantial, yet statistically insignificant because:

1. The group size was small;
2. The symptoms were mild to begin with in both groups so only a small improvement was feasible;
3. The population was elderly with long-standing asthma. Their respiratory trees had already developed irreversible damage of COPD and so the beneficial changes were of moderate to small magnitude.

C. Objective clinical observations

Two parameters, the breath holding time (BHT) and the peak expiratory flow rate (PEFR) were recorded every month. This gave an idea of seasonal response in both the groups. As with symptoms, for the simplicity of statistical calculations and presentations only quarterly data at pre or month 1, month 4, month 7, month 10 and month 13 were used.

Both groups showed steady improvement in BHT throughout the study period. The improvement was of higher magnitude and more uniform within the whole group in the yoga group. The sudden big improvement in the first quarter was due to the seasonal effect of warm, dry months. In the control group, improvement fluctuated in the different quartiles of the group. See the percentile data in Table 12 and the accompanying bar graph. The improvement in mean BHT in the yoga group is about 6.5 seconds and in the control group about 3.5 seconds. This change was not found to be statistically significant in comparison to the control group ($P\ 0.579$) (see Table 20).

BHT is a measure of cardio-respiratory function. Low oxygen and/or high carbon dioxide levels in the blood due to

poor respiratory reserve (restrictive or obstructive pulmonary disease), slow circulation, increased oxygen demand (exercise, high metabolic rate) or sub-normal atmospheric air can deteriorate it.

PEFR remained more or less unaltered in both groups throughout the study. The improvement in mean PEFR in the yoga group was about 24 litres/minute, and in the control group deterioration was by about 5 litres/minute (see Table 13 and the accompanying graphs). The statistical significance of this change is very marginal in comparison to the control group ($P\ 0.062$) (see Table 20).

PEFR is a measure of resistance to exhaled flow of air, or in other words, state of contractility of bronchioles, at that moment.

Effects of selected practices on PEFR were also studied. The practices of kunjal, ajapa japa done in ujjayi breathing, and nadi shodhana pranayama showed improvement of PEFR consistently and statistically significant, though the actual improvement each time was not clinically useful. The practice of surya namaskara showed marginal, statistically insignificant change. The improvement in Pre level over the months of study period is due to combined effects of all the practices (see Table 1 and the accompanying graphs below).

Effects of individual practices on PEFr in asthmatics.

Kunjla

	Pre	Post
May	318.00	348.00
Jun	330.00	356.32
Jun	322.94	350.59
Jun	370.83	381.67
July	385.00	388.75
July	416.25	430.00
<i>Mean</i>	357.17	375.89
<i>t test</i>	0.007915	

Ajapa japa

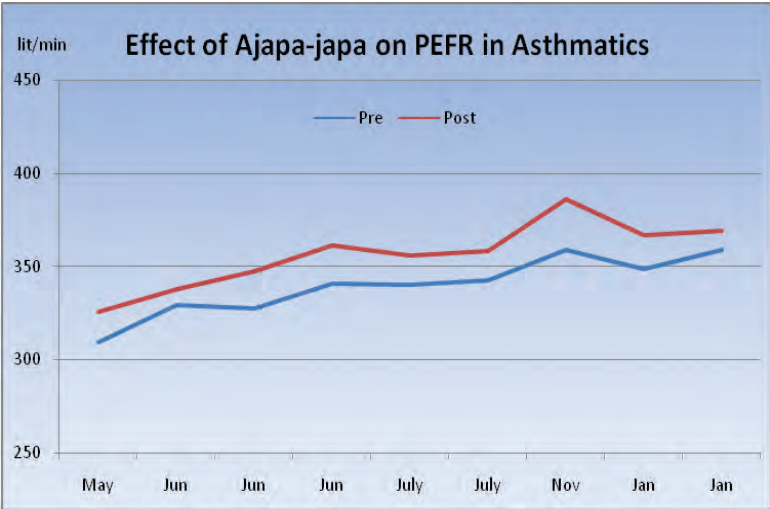
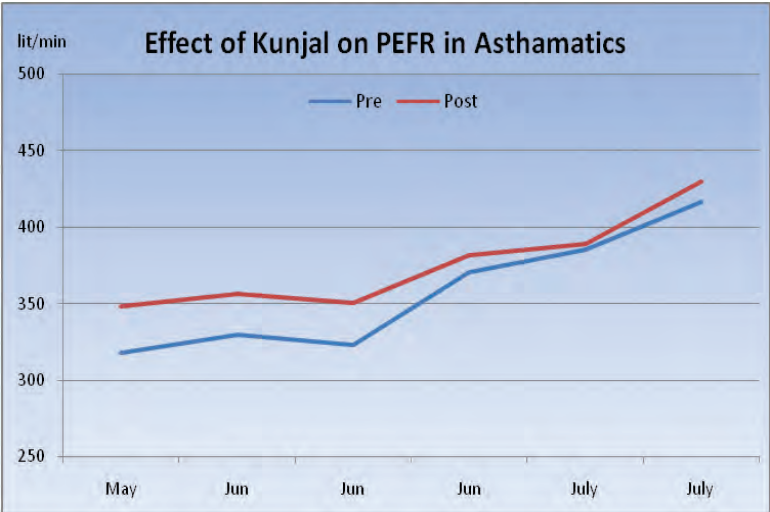
	Pre	Post
May	309.38	325.63
Jun	329.50	338.00
Jun	327.22	347.22
Jun	340.95	361.43
July	340.00	356.09
July	342.38	358.10
Nov	358.75	386.25
Jan	348.46	366.92
Jan	358.89	368.89
<i>Mean</i>	339.50	356.50
<i>t test</i>	0.000019	

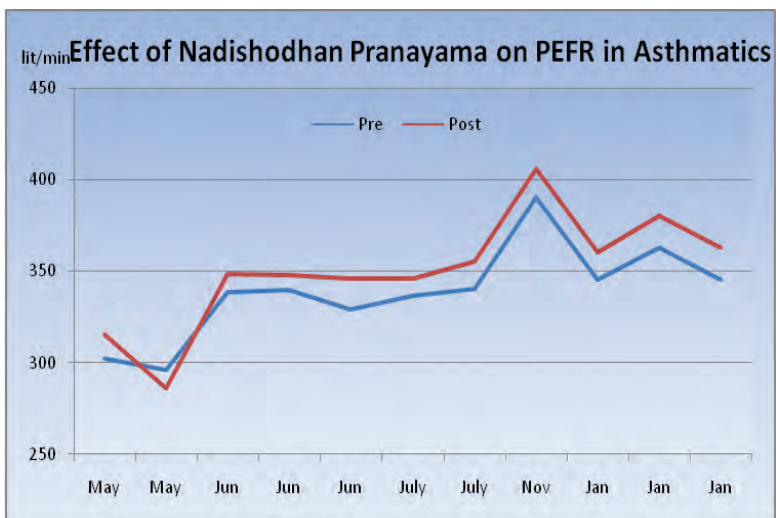
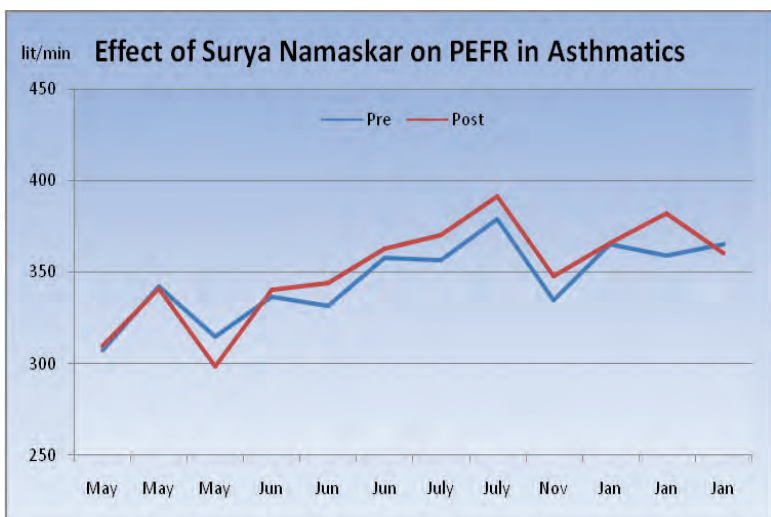
Surya namaskara

	Pre	Post
May	307.00	309.50
May	342.50	340.71
May	315.00	298.33
Jun	336.67	340.56
Jun	331.67	343.89
Jun	357.89	362.63
July	356.67	370.00
July	379.23	391.54
Nov	334.62	347.69
Jan	365.00	365.83
Jan	358.89	382.22
Jan	365.00	360.00
<i>Mean</i>	345.85	351.08
<i>t test</i>	0.112827	

Nadi shodhana pranayama

	Pre	Post
May	302.38	315.67
May	295.83	285.83
Jun	338.64	348.16
Jun	339.57	347.83
Jun	329.05	346.19
July	336.67	346.25
July	340.50	355.50
Nov	390.00	406.00
Jan	345.38	360.00
Jan	362.73	380.00
Jan	345.55	362.73
<i>Mean</i>	338.75	350.38
<i>t test</i>	0.000638	





D. Spirometry

Four parameters were studied in spirometry or the pulmonary function test: Forced Expiratory Volume in first second (FEV1), Forced Vital Capacity (FVC), the ratio of the two (FEV1/FVC) and Maximal Expiratory Flow Rate (MEFR). They were recorded in terms of percentage of normal predicted value for that age, gender and body build. The test was carried out three times during the study: pre, mid or after six months and post or after twelve months.

There was an improvement in mean FEV1 by about 6% in the yoga group. This is statistically insignificant in comparison to the control group (P 0.366). The improvement was more in the upper quartile sub-group, in subjects with better FEV1 to begin with, as they had less severe lung tissue damage or COPD. In the control group it remained unchanged (see Tables 14 and 20 and the accompanying graphs).

The mean **FVC** improved by about 10% in the yoga group and by 5% in the control group. This change is statistically insignificant in comparison to the control group (P 0.199). The improvement was more in the higher quartile sub-group, in the subjects with better FVC to begin with (see Tables 15 and 20 and the accompanying graphs).

The mean of ratio FEV1/FVC deteriorated by 11.5% in the yoga group & by 4 % in control group. This change is statistically insignificant in comparison to the control group (P 0.082). Both FEV1 and FVC improved in the yoga group but the improvement in denominator FVC is more than the numerator FEV1 and hence the ratio showed deterioration. The change was uniform in the control group while in the yoga group it was more in the lowest and the highest quartiles (see Tables 16 and 20 and the accompanying graphs).

The mean MEFR improved by 5% in the yoga group and remained unaltered in the control group. The change is statistically insignificant in comparison to the control group (P 0.606). The improvement was more in the third and fourth quartiles, in the subjects with higher MEFR to begin with (see Tables 17 and 20 and the accompanying graphs).

FEV1 is the volume of air exhaled by maximal effort in the first second after maximal inhalation. It is the most useful monitor for the progress of obstructive lung disease. The improvement is assessed on the absolute readings of FEV1 and not on FEV1/FVC ratio since FVC is also reduced in obstructive airway disease though proportionately less. (John Crofton & Andrew Douglas in *Respiratory Diseases*, 1984, 3rd edition, page 44, Blackwell Scientific Publications, Oxford, UK). It is the cardinal test for asthma as it varies with the calibre of bronchioles. Spasm of bronchiolar muscles will reduce FEV1. We have recorded FEV1, FVC & MEFR in percentage of predicted normal value. The mean value of FEV1 improved in the yoga group to some extent but because of high standard deviation, it is not statistically significant. Some of the subjects in the yoga group underwent second and third spirometry tests when they were having symptoms of cough and/or breathlessness. Also, their BHT and PEFR values were low and BP and pulse-rate were high in that period. Therefore, the results did not reflect an accurate picture. In the control group there was no change in mean FEV1 and standard deviation. In cases of long-standing asthma or COPD, the spasm of bronchiole is irreversible and so a very big change in FEV1 cannot be expected.

FVC is the total volume of air exhaled by greatest force and speed after maximal inhalation. In normal subjects FVC is the same as vital capacity VC but it is proportionately reduced when there is airway obstruction with air trapping. FVC improved in both groups. The yoga group showed more improvement than the control group. Improvement in FVC denotes relief in air trapping and deeper, more effective breathing.

Normally FEV1/FVC is greater than 80%. In the yoga group, improvement in FVC exceeded improvement in FEV1, deteriorating the ratio of the two. In the control group it deteriorated by a much smaller extent as the improvement in FVC was small.

Maximal expiratory flow rate (MEFR) is obtained by the time taken to exhale a given volume from a maximal inspiration. PEFR measures maximum flow rate in L/min at the beginning of expiration. Both PEFR and MEFR usually run parallel and relate to resistance offered by bronchial calibre. Both groups showed improvement in MEFR. The yoga group showed better improvement than the control group.

All four parameters of spirometry showed more changes in the first half of the study in the yoga group. It continued to change in the same direction but at a slower rate in the second half. This effect is a pointer that the effect of yoga manifests within six months though an additional benefit of summer months cannot be ruled out. In the control group, the changes are evenly spread over both periods. The higher quartile sub-group, subjects with less severe disease and better spirometry results, showed more improvement, suggesting that yoga may be more effective in subjects with less severe disease.

E. Medication

The mean of **medication dosage** remained unaltered at 3.32 (3.26 to 3.37) in the yoga group while in the control group it increased from 3.69 to maximum of 4.33 and down to 3.90 in the last month. In the yoga group, the reduction of medication was more in the lower quartiles sub-group, in subjects taking less medication to begin with. The subjects taking bigger doses of medication, the higher quartile sub-group, actually worsened marginally thus levelling out the benefit on the mean value. In contrast, the control group showed more deterioration in the lower quartiles sub-group; the higher quartiles sub-group stayed unaltered (see Table 18 and the accompanying graphs). The change in medication dosage is statistically insignificant in comparison to the control group (P 0.339) (see Table 20).

The number of subjects consuming different categories of medication has been analyzed and presented in Table 19. In

the yoga group, as the body physiology started approaching its normality and symptoms of asthma receded, the need for medication reduced. Use of bronchodilators reduced, the need for systemic steroids did not arise and supportive drugs like anti-allergy and antibiotics were also used in smaller amount.

Summary

- The yoga group and the control group were not completely matching with each other. The ratio of men to women was opposite in the two groups. As a result, the incidence of smoking and work-related stress was more in the yoga group.
- In the yoga group, the improvement in the symptoms of cough, breathlessness and disturbance in sleep was significant clinically but not statistically. There was no change in the symptoms of tightness in chest and wheezing in the yoga group. In the control group there was overall deterioration in all the symptoms except tightness of chest.
- In objective clinical observations, BHT improved in both the groups; the yoga group showed more improvement than the control group. The change was not statistically significant. PEFr remained unchanged in both the groups.
- Spirometry showed marginal improvement in FEV₁, FVC & MEFR and deterioration in the ratio FEV₁/FVC as improvement in FVC was much more than in FEV₁. None of the changes were statistically significant.
- In the yoga group the need for medication reduced, use of bronchodilators reduced, the need for systemic steroids did not arise and supportive drugs like anti-allergy and antibiotics were also used in smaller amount. In the control group all types of medication increased.
- In the subjective symptoms as well as the objective clinical parameters a big improvement was noted in both groups in first quarter, in month of May, marking the seasonal

improvement. The yoga group mostly continued to improve in subsequent quarters while the control group mostly deteriorated back to its original state.

- The overall improvement was more in subjects with less severe disease and better lung function capacity to begin with. This suggests that the more advanced disease with irreversible lung tissue damage responds less to the healing effects of yoga.

Conclusion

In the subjects under study with asthma of more than 5 years duration & COPD, regular practice of Satyananda Yoga:

1. Reduced the symptoms of cough, breathlessness and sleep disturbances but had no effect on the symptoms of tightness in chest & wheezing;
2. Improved breath holding time (BHT) but did not influence PEFr;
3. Improved pulmonary function of FEV1, FVC & MEFR and deteriorated the ratio FEV1/FVC;
4. Reduced the need for consumption of main as well as supportive drugs.

None of the above changes were statistically significant.

Table 2: Asthma – descriptive statistics for cough

	Control (n=21)		Yoga (n=20)	
	Mean	Std dev	Mean	Std dev
Pre (mth 1)	0.57	0.507	0.55	0.605
Qtr 1 (mth 4)	0.38	0.498	0.35	0.489
Qtr 2 (mth 7)	0.62	0.590	0.40	0.503
Qtr 3 (mth10)	0.71	0.784	0.35	0.489
Qtr 4 (mth 13)	0.67	0.577	0.30	0.571

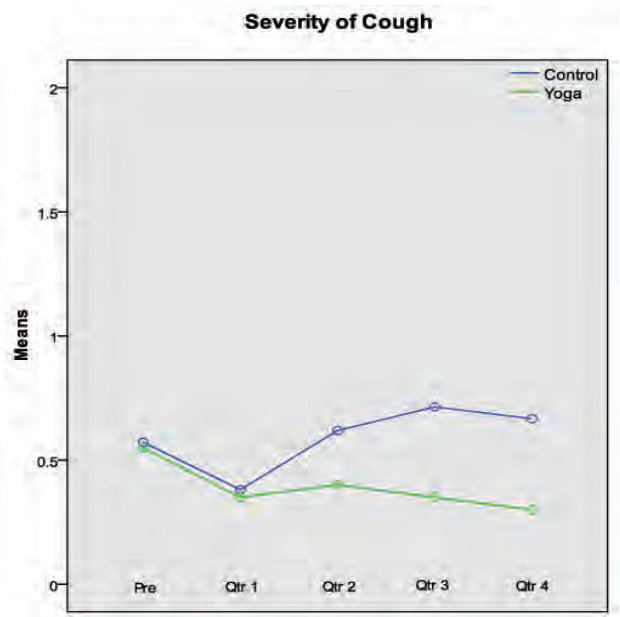


Table 3: Asthma – percentage of subjects with cough

	Control (n=21)				Yoga (n=20)			
	Ab	Mild	Mod	Sev	Ab	Mild	Mod	Sev
Pre (mth1)	42.86	57.14	0.00	0.00	50.00	45.00	5.00	0.00
Mth 4	61.90	38.10	0.00	0.00	65.00	35.00	0.00	0.00
Mth 7	42.86	52.38	4.76	0.00	60.00	40.00	0.00	0.00
Mth 10	47.62	33.33	19.05	0.00	65.00	35.00	0.00	0.00
Mth 13	38.10	57.14	4.76	0.00	75.00	20.00	5.00	0.00
Mean (mths 4-13)	47.62	45.24	7.14	0.00	66.25	32.50	1.25	0.00

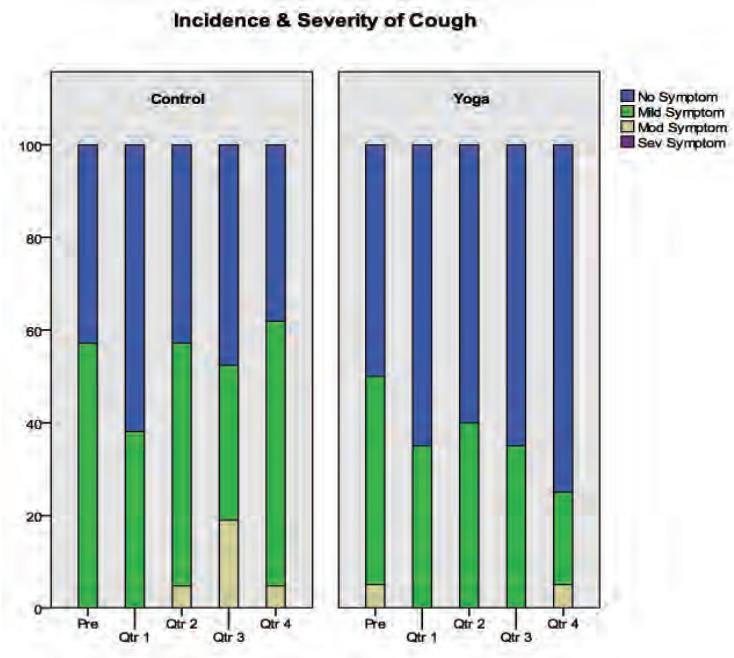


Table 4: Asthma – descriptive statistics for dyspnoea

	Control (n=21)		Yoga (n=20)	
	Mean	Std dev	Mean	Std dev
Pre (mth 1)	0.57	0.507	0.55	0.686
Qtr 1 (mth 4)	0.05	0.218	0.25	0.444
Qtr 2 (mth 7)	0.48	0.680	0.45	0.605
Qtr 3 (mth10)	0.62	0.865	0.30	0.470
Qtr 4 (mth 13)	0.48	0.602	0.25	0.550

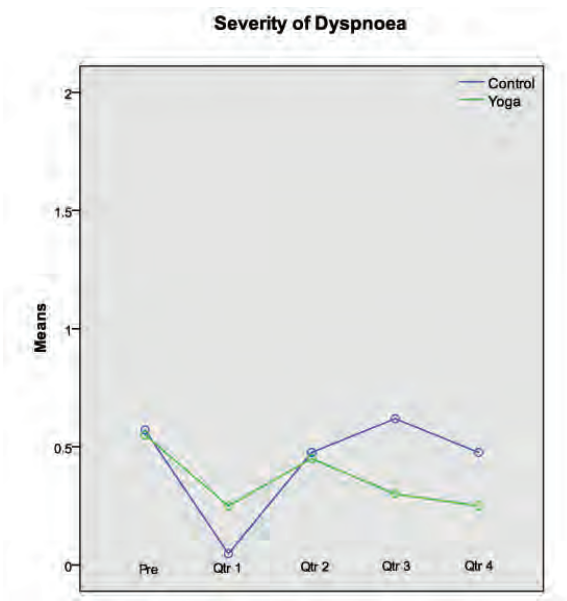


Table 5: Asthma – percentage of subjects with dyspnoea

	Control (n=21)				Yoga (n=20)			
	Ab	Mild	Mod	Sev	Ab	Mild	Mod	Sev
Pre (mth1)	42.86	57.14	0.00	0.00	55.00	35.00	10.00	0.00
Mth 4	95.24	4.76	0.00	0.00	75.00	25.00	0.00	0.00
Mth 7	61.90	28.57	9.52	0.00	60.00	35.00	5.00	0.00
Mth 10	57.14	28.57	9.52	4.76	70.00	30.00	0.00	0.00
Mth 13	57.14	38.10	4.76	0.00	80.00	15.00	5.00	0.00
Mean (mths 4–13)	67.86	25.00	5.95	1.19	71.25	26.25	2.50	0.00

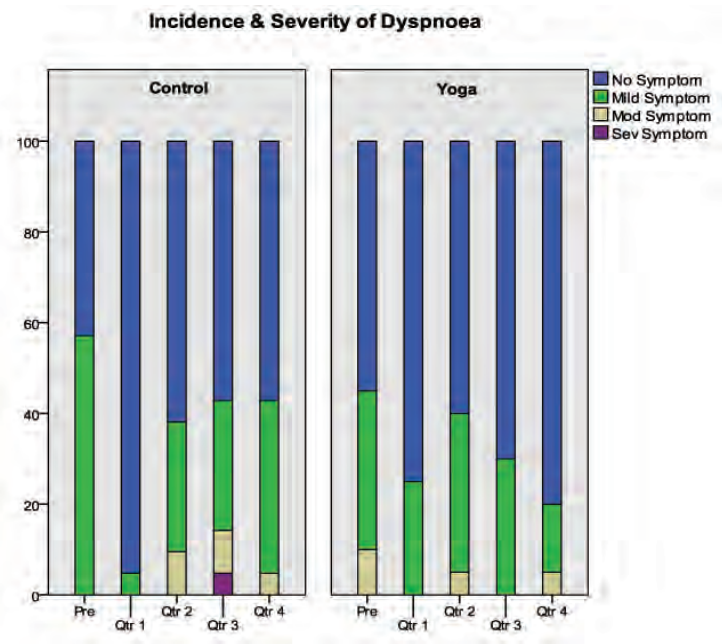


Table 6: Asthma – descriptive statistics for sleep disturbances

	Control (n=21)		Yoga (n=20)	
	Mean	Std dev	Mean	Std dev
Pre (mth 1)	0.57	1.028	0.80	0.951
Qtr 1 (mth 4)	0.10	0.436	0.00	0.000
Qtr 2 (mth 7)	0.24	0.700	0.15	0.671
Qtr 3 (mth10)	0.38	0.805	0.00	0.000
Qtr 4 (mth 13)	0.71	1.102	0.05	0.224

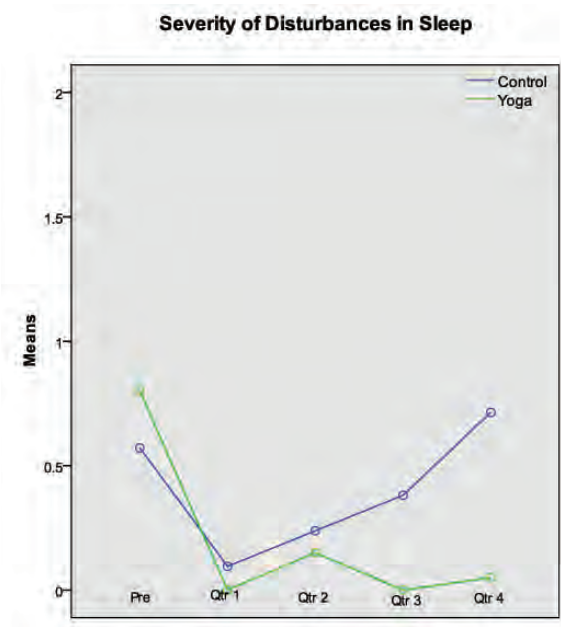


Table 7: Asthma – percentage of subjects with disturbances in sleep

	Control (n=21)				Yoga (n=20)			
	Ab	Mild	Mod	Sev	Ab	Mild	Mod	Sev
Pre (mth1)	71.43	9.52	9.52	9.52	50.00	25.00	20.00	5.00
Mth 4	95.24	0.00	4.76	0.00	100.00	0.00	0.00	0.00
Mth 7	85.71	9.52	4.76	0.00	95.00	0.00	0.00	5.00
Mth 10	76.19	14.29	4.76	4.76	100.00	0.00	0.00	0.00
Mth 13	61.90	19.05	4.76	14.29	95.00	5.00	0.00	0.00
Mean (mths 4–13)	79.76	10.72	4.76	4.76	97.50	1.25	0.00	1.25

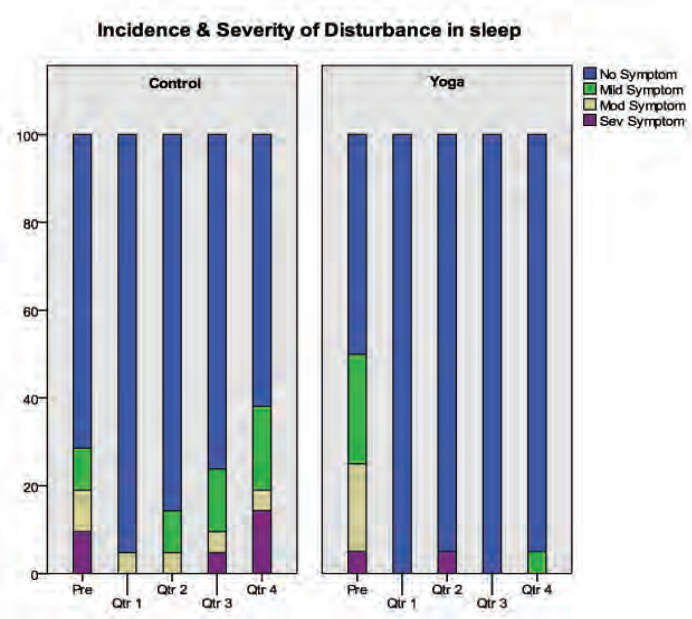


Table 8: Asthma – descriptive statistics for tightness in chest

	Control (n=21)		Yoga (n=20)	
	Mean	Std dev	Mean	Std dev
Pre (mth 1)	0.19	0.402	0.15	0.366
Qtr 1 (mth 4)	0.19	0.402	0.10	0.308
Qtr 2 (mth 7)	0.38	0.498	0.20	0.410
Qtr 3 (mth10)	0.38	0.498	0.15	0.366
Qtr 4 (mth 13)	0.29	0.463	0.15	0.366

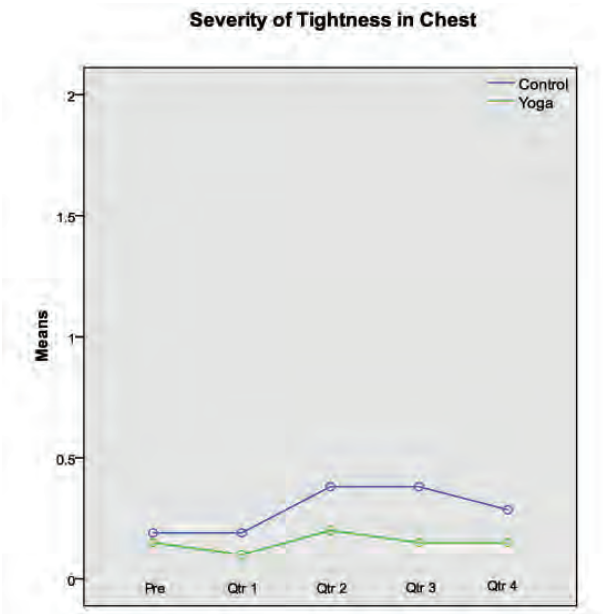


Table 9: Asthma – percentage of subjects with tightness in chest

	Control (n=21)				Yoga (n=20)			
	Ab	Mild	Mod	Sev	Ab	Mild	Mod	Sev
Pre (mth1)	80.95	19.05	0.00	0.00	85.00	15.00	0.00	0.00
Mth 4	80.95	19.05	0.00	0.00	90.00	10.00	0.00	0.00
Mth 7	61.90	38.10	0.00	0.00	80.00	20.00	0.00	0.00
Mth 10	61.90	38.10	0.00	0.00	85.00	15.00	0.00	0.00
Mth 13	71.43	28.57	0.00	0.00	85.00	15.00	0.00	0.00
Mean (mths 4-13)	69.05	30.96	0.00	0.00	85.00	15.00	0.00	0.00

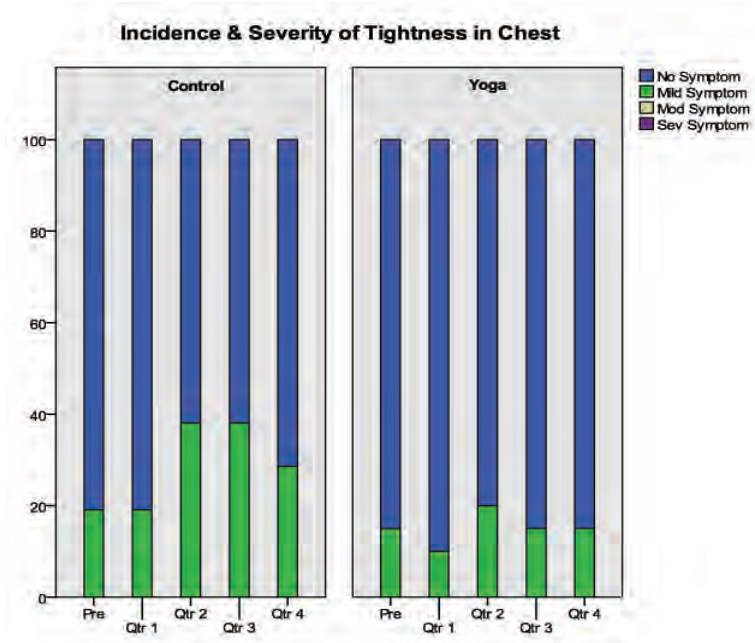


Table 10: Asthma – descriptive statistics for wheezing

	Control (n=21)		Yoga (n=20)	
	Mean	Std dev	Mean	Std dev
Pre (mth 1)	0.29	0.463	0.10	0.308
Qtr 1 (mth 4)	0.05	0.218	0.05	0.224
Qtr 2 (mth 7)	0.33	0.483	0.15	0.366
Qtr 3 (mth10)	0.38	0.498	0.15	0.366
Qtr 4 (mth 13)	0.29	0.463	0.20	0.410

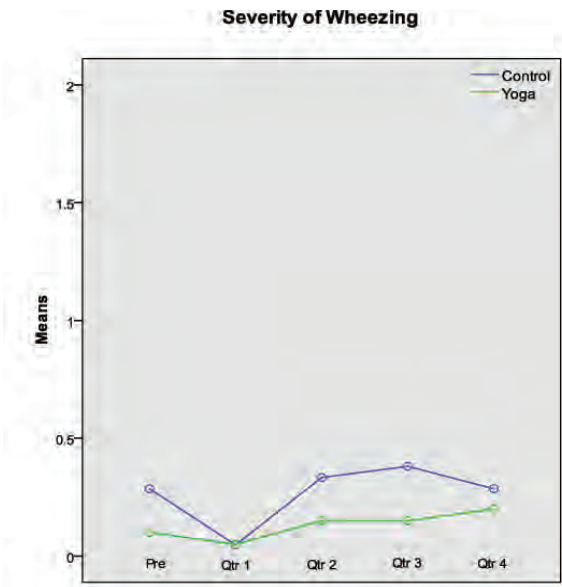


Table 11: Asthma – percentage of subjects with wheezing

	Control (n=21)				Yoga (n=20)			
	<i>Ab</i>	<i>Mild</i>	<i>Mod</i>	<i>Sev</i>	<i>Ab</i>	<i>Mild</i>	<i>Mod</i>	<i>Sev</i>
<i>Pre (mth1)</i>	71.43	28.57	0.00	0.00	90.00	10.00	0.00	0.00
<i>Mth 4</i>	95.24	4.76	0.00	0.00	95.00	5.00	0.00	0.00
<i>Mth 7</i>	66.67	33.33	0.00	0.00	85.00	15.00	0.00	0.00
<i>Mth 10</i>	61.90	38.10	0.00	0.00	85.00	15.00	0.00	0.00
<i>Mth 13</i>	71.43	28.57	0.00	0.00	80.00	20.00	0.00	0.00
<i>Mean (mths 4–13)</i>	73.81	26.19	0.00	0.00	86.25	13.75	0.00	0.00

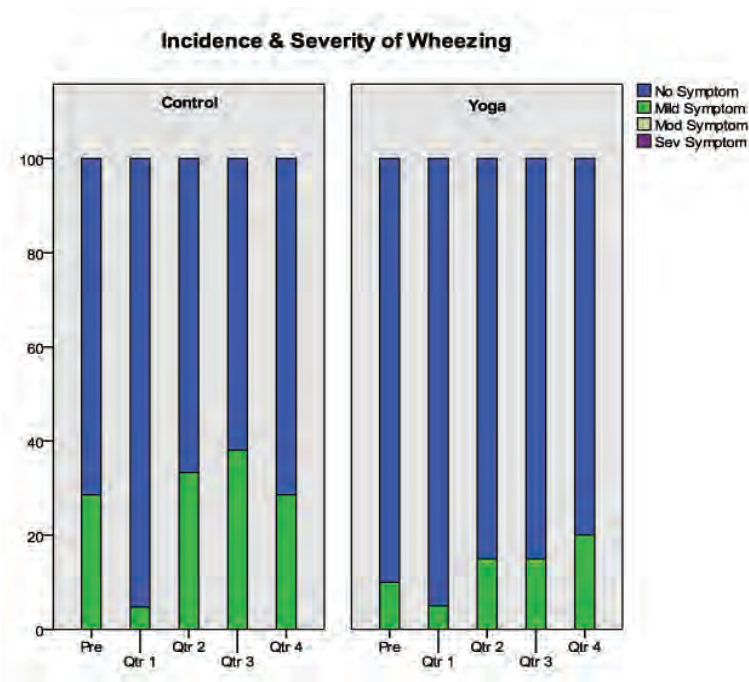


Table 12: Asthma – descriptive statistics for breath holding time (in seconds)

Cn=21 Yn=20	Group	Mean	Std deviation	25 percentile	50 percentile	75percentile
<i>Pre (mth 1)</i>	<i>Control</i>	18.43	8.897	12.00	15.00	22.00
	<i>Yoga</i>	25.15	11.842	15.00	22.50	35.00
<i>Qtr 1 (mth 4)</i>	<i>Control</i>	19.38	9.932	15.00	20.00	20.00
	<i>Yoga</i>	29.30	11.694	20.00	29.00	35.00
<i>Qtr 2 (mth7)</i>	<i>Control</i>	20.33	10.209	15.00	15.00	30.00
	<i>Yoga</i>	27.25	11.059	20.00	25.00	37.50
<i>Qtr 3 (mth 10)</i>	<i>Control</i>	20.10	12.377	10.00	20.00	25.00
	<i>Yoga</i>	29.20	14.002	20.00	25.00	35.00
<i>Qtr 4 (mth13)</i>	<i>Control</i>	21.86	13.720	15.00	16.00	25.00
	<i>Yoga</i>	31.70	11.912	20.00	30.00	40.00

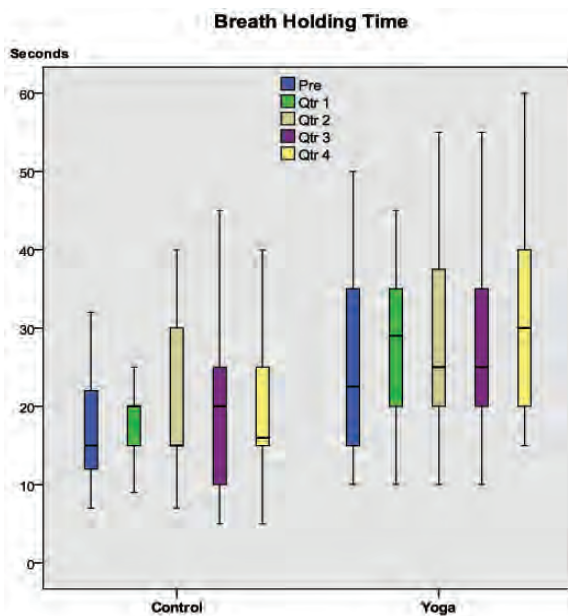
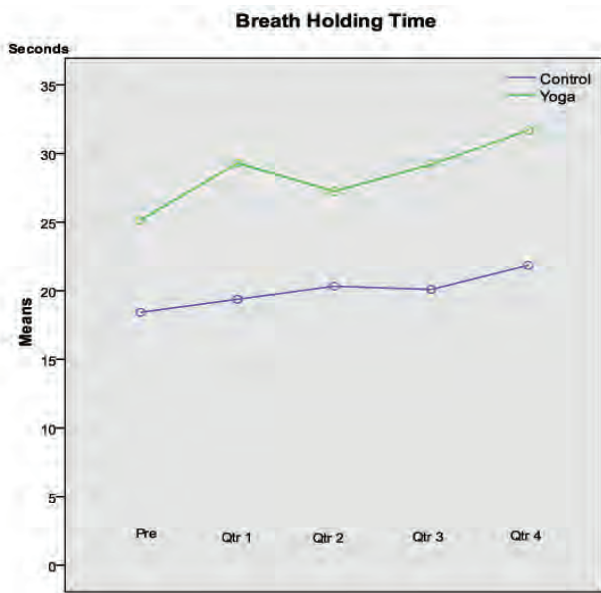


Table 13: Asthma – descriptive statistics for PEFR (in litres/minute)

Cn=21 Yn=20	Group	Mean	Std deviation	25 percentile	50 percentile	75 percentile
<i>Pre (mth 1)</i>	<i>Control</i>	278.10	69.182	210.00	300.00	300.00
	<i>Yoga</i>	342.00	110.577	265.00	350.00	415.00
<i>Qtr 1 (mth 4)</i>	<i>Control</i>	266.19	88.965	200.00	260.00	340.00
	<i>Yoga</i>	390.00	126.741	310.00	405.00	485.00
<i>Qtr 2 (mth 7)</i>	<i>Control</i>	283.33	73.779	230.00	270.00	330.00
	<i>Yoga</i>	365.50	127.794	285.00	375.00	440.00
<i>Qtr 3 (mth 10)</i>	<i>Control</i>	275.24	71.946	230.00	260.00	320.00
	<i>Yoga</i>	357.50	133.806	265.00	390.00	470.00
<i>Qtr 4 (mth 13)</i>	<i>Control</i>	273.81	84.822	230.00	250.00	320.00
	<i>Yoga</i>	366.00	126.549	255.00	385.00	465.00

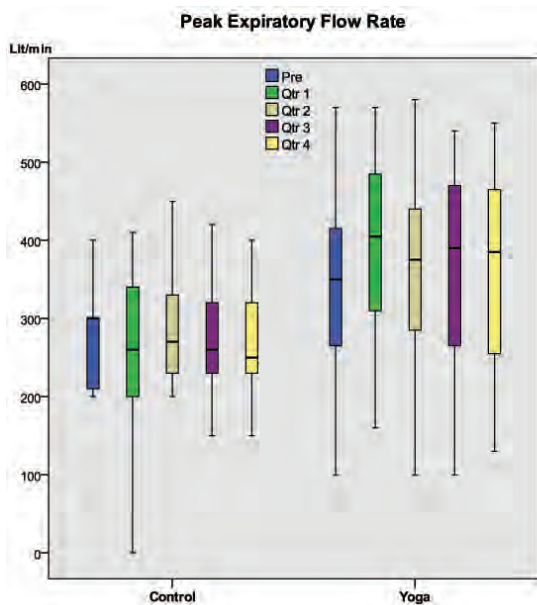
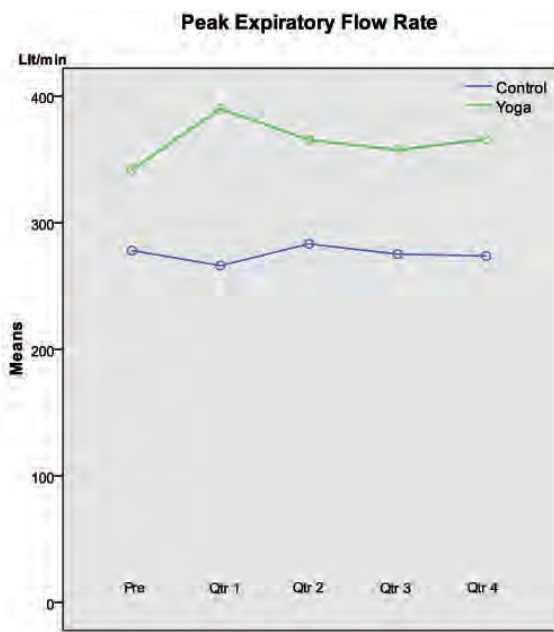


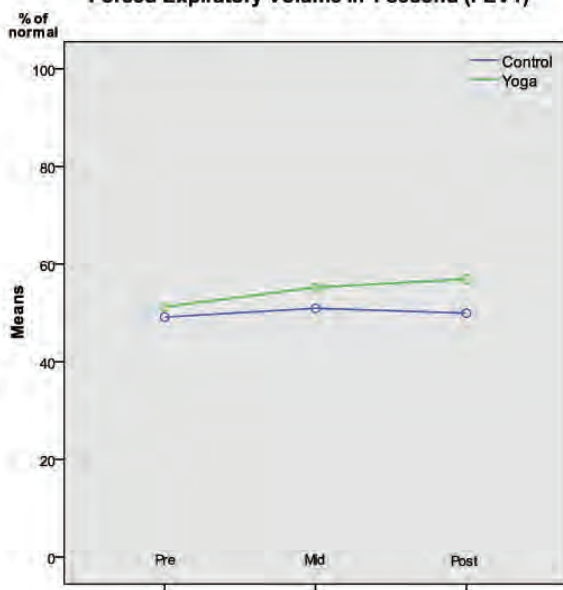
Table 14: Asthma – descriptive statistics for FEV1

Cn=21 Yn=20	Group	Mean	Std deviation	25 percentile	50 percentile	75 percentile
<i>Pre (mth 1)</i>	<i>Control</i>	49.12	14.581	38.50	51.00	61.00
	<i>Yoga</i>	51.22	18.541	37.00	54.00	63.50
<i>Mid (mth 7)</i>	<i>Control</i>	50.93	14.027	39.94	52.60	59.74
	<i>Yoga</i>	55.20	22.869	38.75	53.35	74.38
<i>Post (mth 13)</i>	<i>Control</i>	49.93	14.110	34.85	50.00	63.28
	<i>Yoga</i>	56.87	22.504	40.65	58.20	73.38

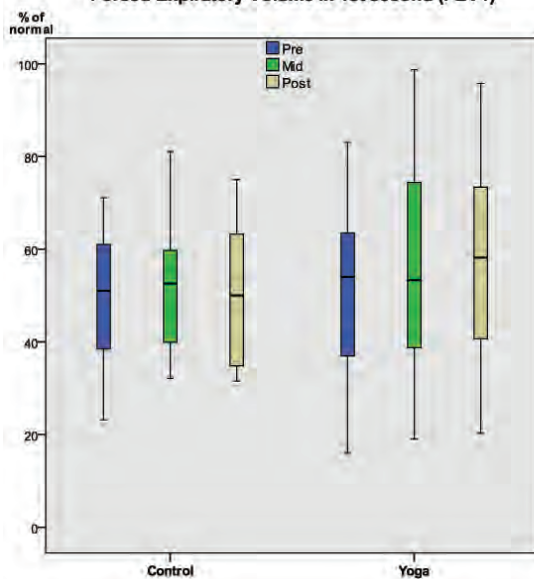
Table 15: Asthma – descriptive statistics for FVC

Cn=21 Yn=20	Group	Mean	Std deviation	25 percentile	50 percentile	75 percentile
<i>Pre (mth 1)</i>	<i>Control</i>	53.03	10.743	45.68	52.00	62.00
	<i>Yoga</i>	52.03	13.567	42.50	53.72	59.50
<i>Mid (mth 7)</i>	<i>Control</i>	58.71	10.520	50.00	57.66	63.40
	<i>Yoga</i>	60.79	17.970	48.44	64.36	73.55
<i>Post (mth 13)</i>	<i>Control</i>	57.99	13.931	46.91	60.80	66.38
	<i>Yoga</i>	61.63	18.653	46.73	64.55	71.73

Forced Expiratory Volume in 1 second (FEV1)



Forced Expiratory Volume in 1st second (FEV1)



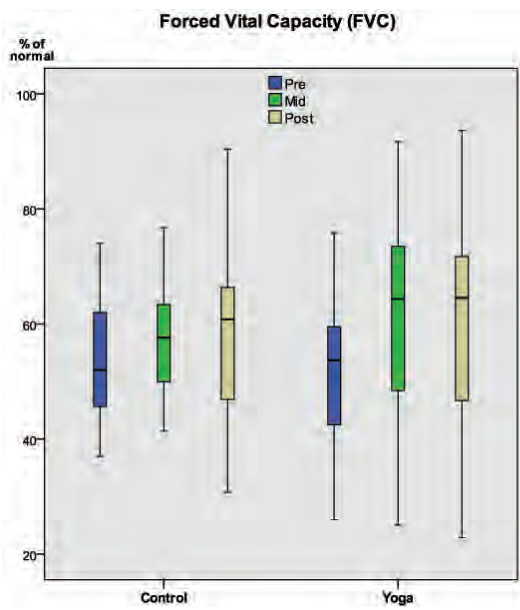
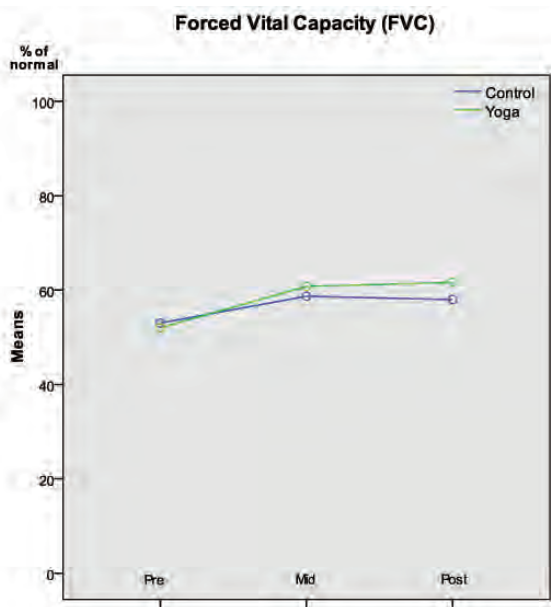
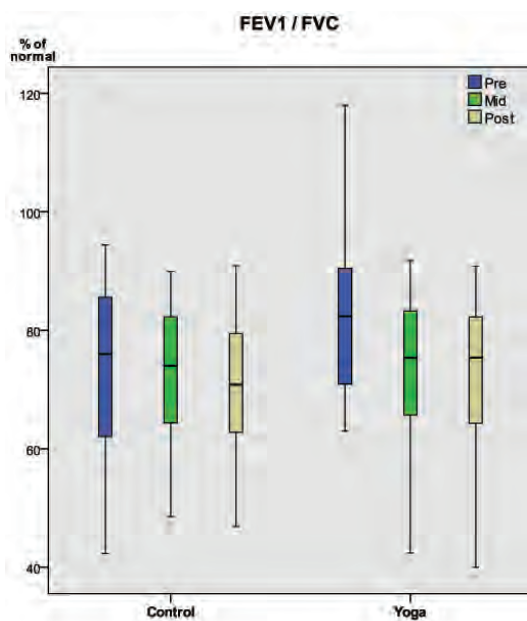
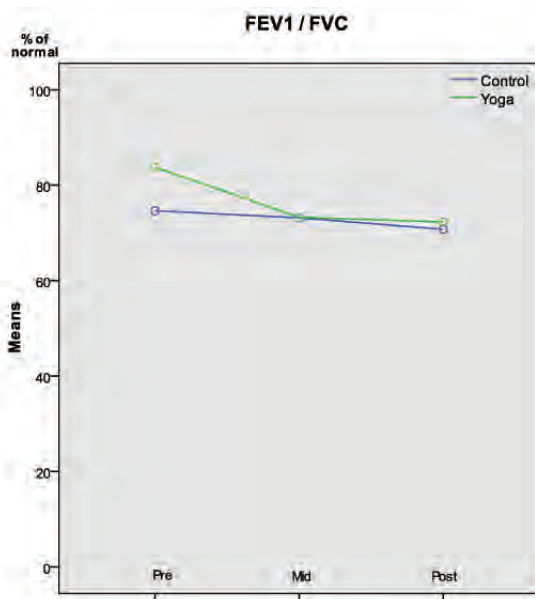


Table 16: Asthma – descriptive statistics for FEV1/FVC

Cn=21 Yn=20	Group	Mean	Std deviation	25 percentile	50 percentile	75 percentile
<i>Pre (mth 1)</i>	<i>Control</i>	74.65	14.618	62.07	76.00	85.60
	<i>Yoga</i>	83.77	16.120	70.94	82.40	90.46
<i>Mid (mth 7)</i>	<i>Control</i>	73.16	12.457	64.40	74.00	82.26
	<i>Yoga</i>	73.28	14.099	65.70	75.35	83.25
<i>Post (mth 13)</i>	<i>Control</i>	70.76	11.757	62.80	70.80	79.43
	<i>Yoga</i>	72.29	13.491	64.29	75.40	82.25

Table 17: Asthma – descriptive statistics for MEFR

Cn=21 Yn=20	Group	Mean	Std deviation	25 percentile	50 percentile	75 percentile
<i>Pre (mth 1)</i>	<i>Control</i>	37.90	21.378	20.00	32.00	52.00
	<i>Yoga</i>	45.46	30.088	22.00	44.00	62.00
<i>Mid (mth 7)</i>	<i>Control</i>	40.57	22.227	23.50	33.30	53.89
	<i>Yoga</i>	51.35	37.353	23.95	38.76	75.88
<i>Post (mth 13)</i>	<i>Control</i>	38.16	18.838	24.08	32.56	47.86
	<i>Yoga</i>	50.25	33.497	24.47	40.08	70.73



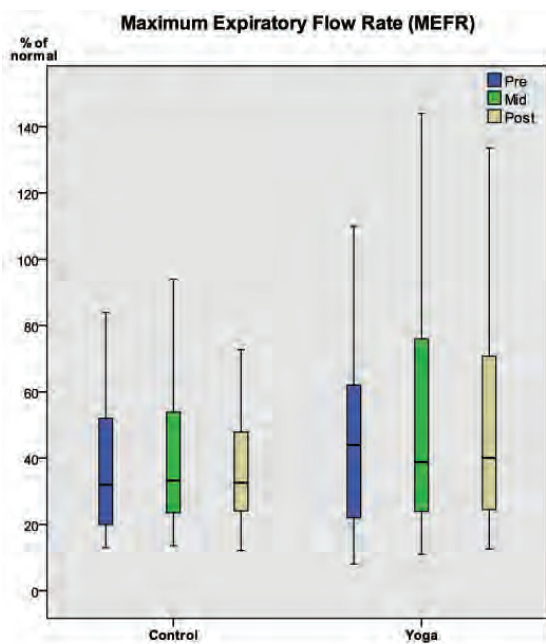
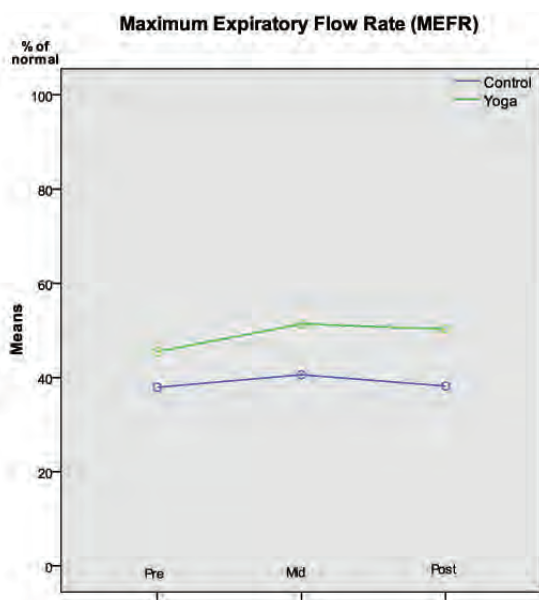


Table 18: Asthma – descriptive statistics for medication dosage

Cn=21 Yn=20	Group	Mean	Std deviation	25 percentile	50 percentile	75 percentile
<i>Pre (mth 1)</i>	<i>Control</i>	3.69	1.569	2.00	4.00	5.00
	<i>Yoga</i>	3.32	1.455	2.50	3.00	4.00
<i>Qtr 1 (mth 4)</i>	<i>Control</i>	3.64	1.442	2.00	4.00	4.50
	<i>Yoga</i>	3.26	1.661	2.00	3.00	4.00
<i>Qtr 2 (mth 7)</i>	<i>Control</i>	4.05	1.746	3.00	4.00	5.00
	<i>Yoga</i>	3.37	1.862	2.00	3.00	4.50
<i>Qtr 3 (mth 10)</i>	<i>Control</i>	4.33	1.853	3.00	4.00	5.00
	<i>Yoga</i>	3.26	1.727	2.00	3.00	4.00
<i>Qtr 4 (mth 13)</i>	<i>Control</i>	3.90	1.375	3.00	4.00	5.00
	<i>Yoga</i>	3.26	1.821	2.00	3.00	4.50

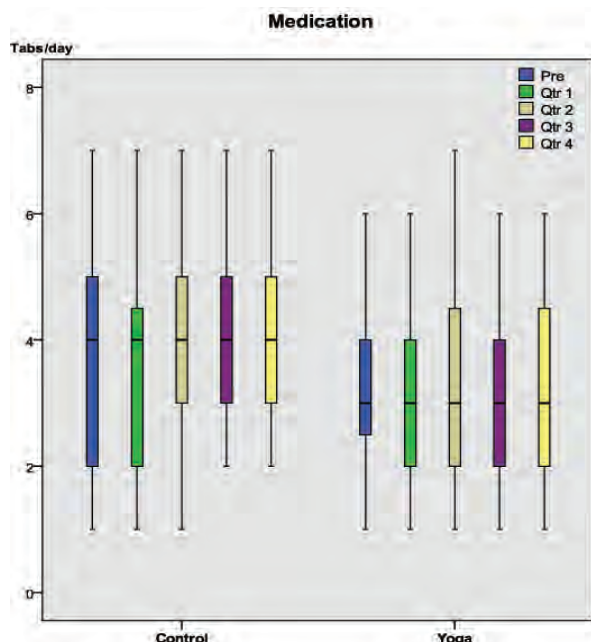
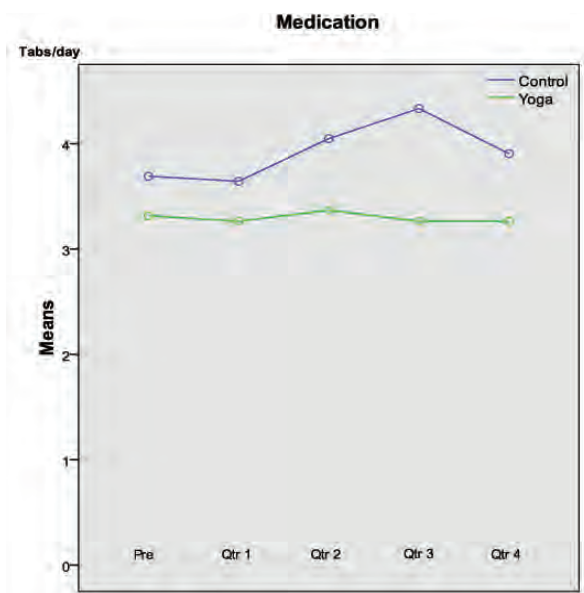


Table 19: Asthma – use of medication

Cn=21 Yn=20		Increase	No change	Decrease	Not used	Total
<i>Main broncho-dilator</i>	<i>Control</i>	2	17	2	0	21
	<i>Yoga</i>	1	13	6	0	20
<i>Second broncho-dilator</i>	<i>Control</i>	10	8	0	3	21
	<i>Yoga</i>	3	8	3	6	20
<i>Anti-allergy</i>	<i>Control</i>	6	3	0	12	21
	<i>Yoga</i>	2	2	2	14	20
		Used		Not used		Total
<i>Systemic steroid</i>	<i>Control</i>	2		19		21
	<i>Yoga</i>	0		20		20
<i>Antibiotic</i>	<i>Control</i>	7		14		21
	<i>Yoga</i>	4		16		20

Table 20: Asthma – multivariate tests (quarterly*group; Wilks' Lambda)

Cn=21 Yn=20	F *	df	Significance	Eta square **	Power ^b ***
<i>Cough</i>	1.030 ^a	4,36	0.405	0.103	0.291
<i>Dyspnoea</i>	1.870 ^a	4,36	0.137	0.172	0.511
<i>Sleep disturbances</i>	1.395 ^a	4,36	0.255	0.134	0.389
<i>Tightness in chest</i>	0.373 ^a	4,36	0.826	0.040	0.125
<i>Wheezing</i>	1.116 ^a	4,36	0.364	0.110	0.314
<i>BHT</i>	0.727 ^a	4,36	0.579	0.075	0.211
<i>PEFR</i>	2.470 ^a	4,36	0.062	0.215	0.645
<i>FEV1</i>	1.031 ^a	2,38	0.366	0.051	0.217
<i>FVC</i>	1.684 ^a	2,38	0.199	0.081	0.332
<i>FEV1 / FVC</i>	2.679 ^a	2,38	0.082	0.124	0.499
<i>MEFR</i>	0.508 ^a	2,38	0.606	0.026	0.127
<i>Medication dosage</i>	1.173 ^a	4,35	0.339	0.118	0.329

a. Exact statistic

b. Computed using alpha=0.05

ASTHMA – TEACHING SCHEDULE (BHEL)

Class Structure

Shanti Mantras	5 (5) minutes
Shavasana	5 (4) minutes
Asana	25 (22) minutes
Talk	10 (0) minutes
Questions	5 (0) minutes
Pranayama	15 (12) minutes
Meditation	15 (12) minutes
Questions	5 (0) minutes
Shanti Mantras	5 (5) minutes

- Asanas will be repeated at least on 3 consecutive days. Only one or two new practices may be introduced on any day.
- Only one pranayama will be introduced in a day. All the pranyamas will be revised every day.
- On the day of laghoo shankhaprakshalana practice other yoga practices will not be done.

Schedule

Practices of previous week/s need to be revised in all subsequent weeks.

Week 1: PM 1

Asanas of laghoo shankhaprakshalana
Shavasana
Breath awareness
Abdominal and yogic breathing
Kaya sthairyam with *Om* chanting

Week 2: Practices of week 1

PM 2 (half of the practices). Omit jhulana lurhakanasana
Padadhirasana
Nadi shodhana pranayama stage 1

Yoga nidra stages 1, 3, 4 and 8

Jala neti

Week 3: Practices of week 1 & 2

PM 2

Swastikasana

Nadi shodhana pranayama stage 2 (alternate nostril breathing)

Bhramari pranayama

Yoga nidra stages 1, 2, 3, 4, 7 and 8

Kunjali

Week 4: Practices of week 1, 2 & 3

Hasta utthanasana

Siddha/siddha yoni asana

Ardha padmasana

Nadi shodhana pranayama stage 2 (counting the duration of breath)

Yoga nidra stages 1, 2, 3, 4, 6, 7 and 8

Laghoo shankhaprakshalana

Week 5: Practices of previous month

Surya namaskara

Nadi shodhana pranayama stage 2 (equalizing inhalation & exhalation)

Kaya sthairyam with *Om* meditation at anahata chakra

Week 6: Practices of previous month and week 5

Ujjayi pranayama

Week 7: Practices of previous month and week 5 & 6

Ardha ushtrasana/ushtrasana

Shashankasana

Prana mudra

Nadi shodhana pranayama stage 2 (lengthening the breath)

Ajapa japa in frontal passage

Week 8: Practices of previous month and week 5, 6 and 7

Eka pada pranamasana

Laghoo shankhaprakshalana, kunjali and jala neti to be done once in fifteen days.

Encourage regularity in yogic practices and also in yogic principles that were recommended in the class. Find out what are their difficulties and help them to solve them.

Acknowledgements

We could undertake such a long study only with
the blessings and inspiring force of our guru Parama-
hansa Swami Niranjanananda,
the broad, unconventional & progressive vision of then
E.D. of BHEL, Bhopal, Shri P.T. Deo,
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Amaresh Kumar and Smt Pratima Prasad,
and the sincerity and regularity of all our participants.

**RESEARCH STUDY: EFFECT OF SATYANANDA YOGA
ON ASTHMA WITH COPD – SUMMARY REPORT**

Method

- 20 subjects in the experimental group practised Satyananda Yoga for 12 months. They continued with their medication. See Appendix 1 for yoga practices.
- 21 subjects in the control group continued with their medication.
- Both groups were followed up every month for 12 months for the following parameters.
- Parameters:
 1. Symptoms of cough, breathlessness, disturbances in sleep, tightness in chest and wheezing
 2. Clinical observations of breath holding time BHT and peak expiratory flow rate PEFR
 3. Spirometry for FEV1, FVC, FEV1/FVC and MEFR
 4. Medication.

Results

1. Symptoms:

Asthma – incidence of symptom-free subjects – pre and in last month

Symptom	Yoga group	Control group
<i>Cough</i>	50.00% to 75.00%	42.86% to 38.10%
<i>Breathlessness</i>	55.00% to 80.00%	42.86% to 57.14%
<i>Disturbance in sleep</i>	50.00% to 95.00%	71.43% to 61.90%
<i>Tightness in chest</i>	85.00% to 85.00%	80.95% to 71.43%
<i>Wheezing</i>	90.00% to 80.00%	71.43% to 71.43%

Asthma – means of severity of symptoms – pre and in last month

Symptom	Yoga group	Control group	F, (Significance), Power
<i>Cough</i>	0.55 to 0.30	0.57 to 0.67	1.030, (0.405), 0.291
<i>Breathlessness</i>	0.55 to 0.25	0.57 to 0.48	1.870, (0.137), 0.511
<i>Disturbance in sleep</i>	0.80 to 0.05	0.57 to 0.71	1.395, (0.255), 0.389
<i>Tightness in chest</i>	0.15 to 0.15	0.19 to 0.29	0.373, (0.826), 0.125
<i>Wheezing</i>	0.10 to 0.20	0.29 to 0.29	1.116, (0.364), 0.314

2. Clinical observations:

Asthma – means of clinical observations – pre and in last month

Clinical test	Yoga group	Control group	F, (Significance), Power
<i>BHT</i>	25.15 to 31.70	18.48 to 21.86	0.727, (0.579), 0.211
<i>PEFR</i>	342.00 to 366.00	278.10 to 273.81	2.470, (0.062), 0.645
<i>Spirometry-FEV1</i>	51.22 to 56.87	49.12 to 49.93	1.031, (0.366), 0.217
<i>Spirometry-FVC</i>	52.03 to 61.63	53.03 to 57.99	1.684, (0.199), 0.332
<i>Spirometry-FEV1/ FVC</i>	83.77 to 72.29	74.65 to 70.76	2.679, (0.082), 0.499
<i>Spirometry-MEFR</i>	45.46 to 50.25	37.90 to 38.16	0.508, (0.606), 0.127

3. Medication:

Asthma – means of medication dosage – pre and in last month

Symptom	Yoga group	Control group	F, (significance), power
<i>Medication dosage</i>	3.32 to 3.26	3.69 to 3.90 (max. 4.33)	1.173, (0.339), 0.329

Asthma – change in medication dosage

	Yoga	Control
<i>Total (n)</i>	20	21
<i>Medication increased</i>	4	10
<i>No change in medication</i>	10	10
<i>Medication reduced</i>	6	2
<i>Steroids used</i>	0	2
<i>Antibiotic used</i>	4	7

Yoga Lifestyle

BACK TO NATURE

From the teachings of Swami Sivananda Saraswati

The body is the most marvellous and delicate machine in the world. It is a highly complex mechanism. Even the most eminent doctors in the world have not completely understood its structure and working. One virulent microbe can destroy the body in an instant. It is surrounded on all sides by enemies – and yet we live. This is a great mystery.

Disease is not a condition that ought to frighten one. It is not brought about by outside agencies, but it is the result of the kickings of life. It is a reaction of life to the entry of foreign matter into the system. Disease is only a sign of health.

Life's cleansing process is called disease. There is only one disease and that is dis-ease or no ease. It is the struggle of life to get rid of foreign matter. Disease should not to be suppressed with toxic drugs, but nature should be allowed to get rid of it in her own way.

In the animal kingdom, there is seldom any sickness because animals do not violate the laws of nature. Before the age of machinery, life was more natural. People of past generations were much stronger and healthier. Life in the twentieth century is becoming more and more artificial.

There is much deterioration in health and strength. In spite of the innumerable doctors and the latest medical discoveries, people's health is deteriorating.

If one wants radiant health, one ought to return to nature and avail oneself of all the healing agencies in nature, the healing properties of the sun, water, air, earth, the benefits of fasting and herbal plants. Nature tries to keep us healthy, but we bring on sickness by continuous violation of Her laws. Natural laws are relentless and know no mercy. Therefore, we should observe the laws of nature and eat, drink, sleep, think and conduct ourselves in the way laid down by the ancient sages.

ASHRAM LIFE

From the teachings of Swami Satyananda Saraswati

The greatest lesson we have to learn is the lesson of life. This becomes available to us when we decide to step out of our routine existence and adopt some different ways to live by, even if it is for a short time. One of these ways is ashram life, where you can stay for a few days as a sannyasin and live a life that is diametrically opposite to yours and learn how to deal with different situations, different people, different problems and, at the same time, also learn to deal with yourself. Both children and adults should have this experience.

In his youth, Rama lived in an ashram for twelve years, acquiring the skills needed by a young prince who is one day destined to rule. Sita, too, lived in Valmiki's ashram with her sons Luva and Kusha. Krishna also lived in the ashram of Sandeepani. They too went out for bhiksha, slept on the floor and wore the simplest of clothing, although they were from royal families.

Ashram life is as relevant in our lives today as it was then. Even today, to live in the ashram for a few days as a sannyasin offers you the scope for enlarging your

vision about yourself, and about life as well. You begin to understand yourself better, which in itself is a great achievement because it is our great misunderstanding of ourselves that leads us to disharmony.

The ashram acts as a shock absorber for each individual. The traumas, stresses and strains of life sometimes are too demanding for you. They eat up your energy and deplete your reserves. The ashram is an ideal place to stay and recharge yourself by stepping out of your normal life and living not just for yourself. Or if you feel that some unknown obstacle is disturbing your life on account of which you are unable to progress. Often the studies are disturbed or the job unstable. Or the marriage is not materializing. In some cases lack of direction, commitment and seriousness about life could be the cause of disharmony. No matter what the cause, the ashram is a panacea for all ills.

The ashram is not anyone's home. It belongs to everybody and yet to nobody. No one stays in an ashram forever. They come and go like flowing rivers finding new pathways and new terrain.

The word ashram is derived from the word *shram*, which means to labour. So shram forms the foundation of ashram life. Anything you set your heart out to achieve cannot be attained without struggle or effort from your side. A student labours hard to get good marks. A housewife labours hard to look after her family. A husband labours hard to meet the needs of his children. Each and every living creature struggles hard to survive.

In the ashram too the sannyasins labour very hard, but this struggle is for perfection of one's thoughts, words and deeds. The effort is towards attaining balance in these different facets of one's personality. The head, heart and hands must synchronize if you want to realize your goals, whether they are material, spiritual or both. The ashram provides a suitable environment for this metamorphosis to take place because the lifeline of the ashram is spiritual. By spiritual I mean pure and untainted.

Purity of environment enhances that side of your personality which is ready to accept inherent weaknesses and blemishes, change your outlook and opinion as well as improve yourself. The fault is not in the environment or in the people with whom you have to interact, the problems you face arise from within. The circumstances only act as a catalyst to bring them to the surface. Everything you feel, think, say or do is coming from deep within. Ashram life gives you the chance to reflect on this and therefore the changes that take place in you after spending time in the ashram are more permanent and abiding.

Ashram culture is going to be a panacea for the people of this modern era because it will provide them with a positive environment to explode that seed of creativity which is dormant within them.

TOWARDS BALANCE AND HARMONY

From the teachings of Swami Niranjanananda Saraswati

If one simply lives a balanced lifestyle and remains at ease with oneself, there is definitely no place for disease; that is the concept of yogic health. Yoga does not manage symptoms. If one is able to lead a balanced life, problems leave naturally: yoga manages the person, not the disease. Therefore, yoga is not a therapy but a lifestyle.

There is only one real cause which combines every cause, and that is imbalance. Whether it is ecological or pertaining to lifestyle, diet, mind or thinking pattern, the main problem is imbalance.

Physical imbalance is the cause of postural defects, stooping shoulders and other kinds of physiological ailments and diseases. Stomach problems come from dietary imbalance. Mental imbalance arises from conflict and emotional tension. For example, in a family where the husband desires something and the wife wants something

else there is conflict; eventually this can result in diseases like hypertension, diabetes and cardiac problems. Suppressed desire or ambition can lead to asthma.

There is also spiritual imbalance, when the mind is too extrovert, seeking pleasure, satisfaction and peace outside. This leads to mental dissipation, *ashanti*, loss of mental faculties and inner balance. There is ecological imbalance, which gives birth to many kinds of illnesses and diseases. So the one word to define disease is 'imbalance'.

Yoga has never viewed any illness or disease as something purely physiological or psychological. It has always viewed illness in the context of the whole human personality. Therefore, the process of self-observation or self-understanding leads to the experience of optimum health and wellbeing. Yoga does not merely aim for removal of the symptoms which we have become aware of. Yoga is not a method of treating an illness or a disease. Rather it is a method of treating the person who is suffering from a condition by making him or her aware of the personality, and how the personality is interacting in the world at the external level and with the consciousness at the subtle level.

When we are able to do this, we find that our habits change and our lifestyle changes. We also find that our attitudes, perspectives and vision change, and there is a feeling of completeness and wholeness. With this sense of wholeness, the journey into yoga begins. We move forward to experience our life unfolding, growing and evolving. We experience the beginning of yoga philosophy.

What is yoga philosophy? The word 'philosophy' means 'love of knowledge', but in Sanskrit the word is *darshan*, to realize, to see. How do we realize yoga? Head, heart and hands: intellect, emotions and actions – these three qualities are important and need to be balanced and harmonized. This is the beginning of yoga philosophy.

Yoga philosophy does not begin with high flying ideas of divine consciousness manifesting in the human body, but with recognition of the qualities that are inherent in

our lives, that can be unified and harmonized: the qualities of head, heart and hands. The moment we are able to observe the qualities of the mind, the reactions, actions and expressions of the mind, when we are able to know the expressions of the emotional nature and how we interact with other people and with our environment, we obtain a more complete and balanced perspective. We perceive and work towards positive solutions for all. Life becomes creative as our feelings, thoughts and actions are aligned, straightforward and innocent. When we are able to bring these three areas together, yoga philosophy is being lived.

The regulation of lifestyle through the practice of yoga leads to internal harmony, *anushasana*, and enables one to realign, readjust and rebalance one's life. This is the biggest contribution of yoga from the yogic perspective.

Yoga Capsules

What is a Yoga Capsule?

Considering the lack of time for yogic practice and the speed of life in modern times, Swami Niranjanananda has introduced a specific sequence of sadhana, a set of practices that are easy to do, that take only a short time to complete and which will give benefits on all levels of being. He called this sadhana the 'yogic capsule'. As one takes a capsule of vitamins a day for good health, one should take a 'yogic capsule' to balance the energies in the body, improve mental efficiency, harmonize the emotions, and bring excellence in one's undertakings. With this sadhana, anyone can incorporate yoga in their lifestyle for their betterment and upliftment, without the need for major adjustments.

Become a gardener

The yoga capsule contains three mantras, three to five asanas, one pranayama and a short reflection or relaxation. This capsule is to be 'taken' every day. Everyone can spare ten to fifteen minutes out of twenty-four hours of the day. I have always emphasized that one can use twenty-three hours and forty-five minutes for ambitions, social and family life, but ten to fifteen minutes of every day should be reserved for the self. By adopting this capsule, yoga will become part of one's daily lifestyle and spiritualize it.

Often it is said that one has to be a warrior to win in life, but a warrior wins by shedding blood and suppressing others. Yoga teaches that one has to be a gardener in life. We have

been given a barren piece of land and through our personal effort we have to convert it into a beautiful garden. It requires hard work and diligent effort to remove the rocks and weeds, mix the earth, and prepare proper beds. It is only then that we plant the seed. Once planted, we protect it.

This is the process that we go through when we practise yoga, not to satisfy the whims of our mind, but to follow and experience the aims set by yoga. Yogic goals are clearly defined: cultivation of awareness, disciplining and restructuring the personality, managing the mental and emotional distractions and disturbances, and becoming the observer of one's life and actions. These are the initial goals of yoga. When one focuses on these goals and strives to achieve them, this is yoga sadhana. When one follows the dictates of one's mind, it is yoga practice. When one integrates different yoga practices to aid the development of one's potential in life, one begins to live a yoga lifestyle.

The yoga capsule is a specific sequence of sadhana to incorporate yoga in one's lifestyle. It will help to create a positive and uplifting environment at home, improve mental efficiency, bring creativity in performance, harmonize the emotions, awaken the spirit and bring excellence in all that one does. This is the process of yoga in which one has to learn to become a gardener.

—*Swami Niranjanananda Saraswati*

Integral yoga

A human being is a blending or a combination of body, emotion, psyche and intellect – head, heart and hands, it can be said. If a lopsided path is followed, practising only jnana yoga or hatha yoga or bhakti yoga, and no other yoga, professing that this yoga is supreme, then a great mistake is being made as far as evolution is concerned. One may become an authority on that particular system of yoga, but as far as the development or progress of the inner self is concerned, it will be lopsided.

In order to avoid unbalanced development, it is necessary to make a synthesis, a happy blending of yoga practices. Man is dynamic by nature. He is also emotional, psychic and rational. Some people are predominantly rational, others are predominantly psychic, emotional or dynamic. The path that is in keeping with the predominant aspect of one's personality should be followed with the most zeal, for it will be in accordance with one's nature. This means that one may be a hatha yogi, raja yogi, a bhakti yogi, or a karma yogi, but side by side with this yoga other forms of yoga should also be practised.

Jnana yoga, bhakti yoga, raja yoga and hatha yoga are not four different paths. They are like four circles interpenetrating and overlapping each other, a part of each circle forms a part of the other three. All these yogas have to be practised together. The right time, the right amount and also the right duration, depth, intensity and emphasis must be understood.

The needs of all human beings are more or less alike. Only little quantitative and qualitative variations are required to suit one's habits and heredity. The yogic ladder must be ascended step by step. Swami Sivananda was a firm believer in what he called 'integral yoga', in which all aspects of the personality are channeled through performing a combination of these different paths.

—*Swami Satyananda Saraswati*

Song of Little

Eat a little, drink a little,
Talk a little, sleep a little,
Mix a little, move a little,
Serve a little, rest a little,
Do asana a little, do pranayama a little,
Reflect a little, do vichara a little,
Do japa a little, do kirtan a little,
Write mantra a little, meditate a little.

—*Swami Sivananda Saraswati*

Yoga Capsule Common to All

The following are capsules that can be practised by everyone, regardless of any physical ailment and involvement in daily life of professional and family commitments. The practices relevant to diabetes, hypertension and the respiratory system will be presented separately in the next sections.

On waking – mantra

The first step, upon waking up in the morning, is to practise three mantras: Mahamrityunjaya and Gayatri mantras eleven times each and the thirty-two names of Durga three times. Mahamrityunjaya mantra is the mantra of healing, Gayatri is the mantra to acquire wisdom and the thirty-two names of Durga eradicate all disturbances, distractions and distresses from life. The mantras must be practised every morning immediately upon waking up, before beginning to think, before even getting out of bed. People who have followed this guideline have felt a qualitative change in their life, thinking process, performance, understanding, associations and relationships.

The three mantras are three sankalpas, seeds, which are planted in the subconscious when the mind is peaceful, semi-dormant and not active in the waking state, not connected with the senses or sense objects. Just as one wakes up, one is on the borderline between unconscious and conscious, and that is the time when the seed of a sankalpa must be planted.

Mahāmṛtyuñjaya Mantra

Om tryambakaṃ yajāmahe sugandhiṃ puṣṭivardhanam.
Urvārukamiva bandhanāt mṛtyormukṣīya māmṛtāt.

Gāyatrī Mantra

Om bhūrbhuvahḥ svaḥ tatsaviturvareṇyaṃ.
Bhargo devasya dhīmahi dhiyo yo naḥ prachodayāt.

Durgādvātriṃśannāmamālā

Om durgā durgārtīśamanī durgāpadvinivāriṇī.
Durgamachchedinī durgasādhinī durganāśinī.
Durgatoddhāriṇī durganihantrī durgamāpahā.
Durgamajñānadā durga daityalokadavānalā.
Durgamā durgamālokā durgamātmavarūpiṇī.
Durgamārgapradā durgamavidyā durgamāśritā.
Durgamajñānasamsthānā durgamadyānabhāsinī.
Durgamohā durgamagā durgamārthavarūpiṇī.
Durgamāsurasamhantrī durgamāyudhadhāriṇī.
Durgamāṅgī durgamatā durgamyā durgameśvarī.
Durgabhīmā durgabhāmā durgabhā durgadāriṇī.

Asana and pranayama

For the asana and pranayama practice or morning session refer to the chapter referring to the individual yoga capsule for the management of diabetes, hypertension and the respiratory system.

In the afternoon – relax and reflect

During the afternoon when one feels tired or stressed out, a short yoga nidra should be practised. At night, when one returns home, another investment of five minutes is necessary. The practice is analysis of the events that have happened during the day. One can go through the events of the day in the mind sequentially, from the morning right up to the present moment. One has to look at the events

and identify those where one encountered conflict, stress, aggression and fear.

One needs to be an objective witness to all that has happened, and gradually, without reacting, bring a simple thought in the mind, “Is there a better way to deal with this situation if it happens again?” Within a week of this practice, one will be able to direct efforts to manage the stressful situations in a better way. In addition, by observing and recognizing the stressors of the day, one eliminates them so they do not become unconscious seeds.

At night – meditate

Just before going to sleep, ten minutes of a short meditation must be practised. The purpose is to connect with the inner values, strengths and peace, put aside all problems, and be at peace with oneself. During those ten minutes, there should be no thoughts of family or profession, no problems and no tension. One should identify neither with the body with its experiences of stiffness and tiredness nor with the mind or mental experiences. No thought of rejection or pain, pleasure or happiness, promotion or demotion.

For ten minutes, there should be an awareness of only oneself, away from everyone else in the world. One must say to oneself, “I am not so and so. I am pure spirit, flawless, undisturbed, at peace with myself, discovering myself.” Isolating oneself from fears, stresses and anxieties, from all physical, emotional and mental connections, the focus must be on the silence and space within. If there is time, a mantra may be repeated for one mala.

Other routines

In this way, gradually, small routines and disciplines of yoga can be incorporated within normal daily activities. The capsules may be practised from Monday to Friday, and on Saturday a different activity may be undertaken, such as neti, ajapa japa, antar mouna or trataka. On Saturday evening, the Mahamrityunjaya mantra may be chanted 108

times. On Sunday, nothing. This is the yoga capsule in daily life.

Another capsule: once a year a visit to an ashram should be made, living there in a simple manner. It means changing the environment from home to ashram, changing one's attitudes, work, routine and associations. This will recharge one's batteries. Just one week of ashram living will bring a qualitative change in life. That is the second capsule that needs to be taken at least once a year. If this discipline is maintained in life for some years while following other interests also, one will begin to experience the benefits of yoga in life. Yoga will become a part of life and not remain a practice.

Yoga Capsule – Management of Diabetes

SHATKARMA AND ASANA

There are different systems of yoga. One branch of yoga is hatha yoga, which is the physical component of yoga, including the practice of physical postures called asanas. Asanas work at the physical level by stretching and toning the body. When the body is toned and the systems are working in harmony with each other, physical efficiency increases a hundredfold.

There are many different kinds of postures. What is their aim, what are they meant for? The postures or asanas are classified into groups. One group releases pressure or tensions and tightness from the body. Another group directly influences and affects the internal organs of the body. Another group releases the energy blocks from different parts of the body. Another group is used in healing the body. There are a wide variety of postures or physical movements that can be practised by the individual.

Numerous studies have been conducted around the world, proving that many physical problems, illnesses and diseases can be managed through yoga. Respiratory problems, circulatory problems and digestive problems can be effectively managed through yoga. People are now working on autoimmune deficiencies and have found that when the postures are performed, they alter the behaviour of the organ which is affected.

Sometimes a change can happen in the body which is similar to a miracle. Of course, it is not a miracle, it is just the body regaining its health and wellbeing. Take, for example, diabetes, in which glucose is not absorbed by the body and insulin is not produced in the body. Medical research has shown that through the practice of asanas it is possible to correct this state. Similarly, yogasanas have been found beneficial in remedying various specific physical disorders.

There is also the general toning and enhancing of physical abilities. Yoga believes that as the muscular and nervous blocks are relieved, the body is revitalized. This has been the subjective experience of many people who practise yoga. The feeling of energy, the feeling of stamina, the ability to control the tiredness of the body by controlling the breath, the ability to bring down the heartbeat, hypertension and the hyperactivity of the brain through breath regulation, to sharpen the senses so as to optimize performance; these are some of the outcomes of the physical postural practices.

—Swami Niranjanananda Saraswati

The following practices were given to patients suffering from NIDDM. Over a forty-day period positive results were reported by all participants.

Shatkarmas:

1. Jala neti and kunjla kriya practised once per week.
2. Laghoo shankhaprakshalana once per month.

Asana:

1. The practices of pawanmuktasana 1 and pawanmuktasana 2 strengthen and prepare the body. They give stamina and flexibility, and tone the entire digestive system.
2. The practice of surya namaskara strengthens the whole body and can be done in various ways for differing effects:
 - For physical wellbeing: practised dynamically with breath awareness;
 - For mental and emotional wellbeing: practised slowly with a focus on breath and mantra repetition;
 - For pranic and spiritual awareness: practised with a focus on breath, mantra and chakra.
3. Advanced practices which help in the management of diabetes are four: i) ardha matsyendrasana (progressing to poorna matsyendrasana for those who can do it);

- ii) gomukhasana; iii) eka pada paschimottanasana;
 - iv) shashank bhujangasana.
4. Additional practice of tadasana, tiryak tadasana and kati chakrasana can be done at the beginning of the asana session to maintain a healthy, strong and flexible spine. Each asana session should be concluded with sufficient time spent in shavasana, fully relaxing the body. While lying in shavasana, one may practise simple breath awareness to enhance the state of relaxation.

PRANAYAMA

Prana is the universal principle of energy or force. It is vital force. Prana is all-pervading. It may be either in a static or dynamic state. It is found in all forms, from the lowest to the highest, from the ant to the elephant, from the unicellular amoeba to a man, from the elementary form of plant life to the developed form of animal life.

It is prana that shines in your eyes. It is through the power of prana that the ear hears, the eye sees, the skin feels, the tongue tastes, the nose smells, the brain and the intellect perform their respective functions. The smile on the face of a young lady, the melody in music, the power in the emphatic utterances of an orator, the charm in the words of one's own beloved wife – all these and many more have their origin in prana. Fire burns through prana. Wind blows through prana. Rivers flow through prana. The steamer and the airplane, the train and the motor car move about only through the power of prana. Radio waves travel through prana. Prana is electron. Prana is proton. Prana is force. Prana is magnetism. Prana is electricity. It is prana that pumps blood from the heart into the arteries. It is prana again that does digestion, excretion and secretion.

Prana is expended by thinking, willing, acting, moving, talking, writing, and so on. A strong and healthy man has an abundance of prana or vitality. The prana is supplied by food, water, air and solar energy.

Just as a goldsmith removes the impurities of gold by heating it in the blazing furnace and vigorously blowing the blowpipe, so also the student of yoga should remove the various impurities of his body and mind by blowing his lungs through the practice of pranayama. Just as it takes a long time, patience and perseverance to tame a lion, an elephant or tiger, so also this prana.

—*Swami Sivananda Saraswati*

The following pranayama practices are beneficial in the management of diabetes:

1. **Abdominal breathing** can be done not only during a practice session but at any time during the day. Awareness is taken to the abdomen and the natural movement is observed. Slowly while inhaling, the abdomen is expanded as much as possible with effort but without strain. With every exhalation, the abdomen relaxes completely expelling all air.
2. **Nadi shodhana**, alternate nostril breathing, is an effective practice to balance the nervous activities, as it brings about a balance in the functions of the sympathetic and parasympathetic nervous systems and clears the pranic channels.
3. **Bhramari pranayama**, humming bee breath, creates a particular frequency of vibration inside the brain that releases the cerebral, nervous and hormonal agitations. Subsequently one experiences tranquillity, peace and contentment.
4. **Bhastrika** (optional), bellows pranayama, draws air forcefully and quickly in and out of the lungs as through the bellows of a village blacksmith. One should not perform it without the guidance of a competent yoga teacher, and in high BP or other cardiac risk factors.

YOGA CAPSULE SADHANA FOR THE MANAGEMENT OF DIABETES

According to the time available for sadhana, the practices can be divided into daily sessions, covering the whole range of practices within a week. Here is an example of a one-week routine:

Asana

<i>Monday, Wednesday, Friday</i>	Pawanmuktasana 1: 5–10 rounds Surya namaskara: 3–6 rounds Eka pada paschimottanasana Ardha mastsyendrasana
<i>Tuesday, Thursday, Saturday</i>	Pawanmuktasana 2: 5–10 rounds Tadasana, tiryak tadasana, kati chakrasana: 5–10 rounds Shashank bhujangasana Gomukhasana

Pranayama

<i>Monday to Saturday</i>	Abdominal breathing: 5–10 minutes Nadi shodhana: 5–10 rounds
<i>Monday, Wednesday, Friday</i>	Bhramari: 7–11 rounds
<i>Tuesday, Thursday, Saturday</i>	Bhastrika: 5–10 rounds

One may end the session with a few moments of stillness observing the effects of the sadhana, or with the chanting of a stotra.

The practice of shatkarmas may be included as convenient.

Yoga Capsule – Management of Hypertension

SHATKARMA AND ASANA

What is the concept of asana? It is a posture that is comfortable and steady – this means that in the practice of asana there is a relationship of body with mind. By doing contortions, by training the body and putting it in certain postures, does the body become steady and comfortable? No, in order to make the physical body steady and comfortable there must be a process by which the mind can also be made steady and comfortable.

The mental state reflects on the body and the physical state of experience reflects on the mind. So asana is not just the physical posture, it is also the mental posture. It is a state of mind, an altered state of mind, in which the practitioner can remain one-pointed and steady. One must be able to stop the fluctuations of the mind and be comfortable in that state.

Therefore yoga has always made the statement that asanas alone are enough to alter the state of consciousness; therefore, a physical posture is as important as meditation. The general theory is that meditation is a mental process and physically one can be in any posture and one need not worry about that aspect. That is all right, it is acceptable. But when one enters the serious practice of dhyana, it requires the steadiness of the posture, the sense of being comfortable in the posture, the willpower plus the creativity – so all the time there is the linking of body and mind. This is the physical aspect of yoga.

Throughout the world, lack of discipline has become a major problem in every phase of life, and yogasana will play a major role in containing this difficulty. Taking into consideration the present time and need, the following

definition of yoga is applicable: yoga is a definite method for physical, mental, emotional and spiritual development, as yoga improves, strengthens and develops both the body and mind. Through yoga, one can discipline the body and mind.

The man who is unable to observe individual discipline will not understand the meaning of social discipline or be able to follow it. Sage Patanjali starts his *Yoga Sutras* with: *Atha yogah anushasanam* – “Therefore, complete discipline is yoga.”

Everyone wishes his body and mind to be fit and efficient. Yogasanas are postures to keep both the body and mind healthy. If the body is unhealthy, the mind will be unhealthy. The first benefit of yogic postures is sound physical health. To achieve this, regular practice of yogasanas is essential.

There are many postures which can be practised, but initially one should practise for only ten to fifteen minutes daily. All the systems of the body will begin to function normally with regular practice of yogasanas. Change takes place in the adrenal system, the thyroids, the pancreas and other vital endocrinal glands. Proper and regulated control, training and expression of these glands brings about change: just as food is essential to nourish the body and generate energy, different postures are required for the healthy functioning of the muscles, bones, joints and nerves.

The daily practice of yogasanas reduces muscular and nervous tensions, rectifies and improves digestive function, removes lethargy and laziness, and keeps one active and efficient throughout the day. When the body and mind are light and free of tension, more physical and mental work can be done. Asanas guard against the inner disorders of the body and provide strength and health.

—Swami Satyananda Saraswati

The following practices were found beneficial in the management of hypertension and conditions of the coronary system:

Shatkarmas:

Jala neti once per week.

Asana:

- Pawanmuktasana 1 (except the series of greeva sanchalan-asana)
- Pawanmuktasana 2 (except jhulana lurhakanasana and naukasana)
- Tadasana, tiryak tadasana, kati chakrasana
- Marjari asana
- Padadhirasana
- Baddha hasta utthanasana
- Ardha shalabhasana
- Saral bhujangasana or
- Bhujangasana
- Matsya kridasana
- Makarasana
- Eka pada pranamasana

PRANAYAMA

Commonly, relaxation means an easy chair, a cup of tea or coffee, and a television, 'Oh, I am relaxing now'. No! In yoga, relaxation means freeing the whole system from tension – not only the physical body, but also the conscious and subconscious mind. Sometimes when the physical body is resting, the mind is not. Sometimes the conscious mind is relaxing but the subconscious mind is not.

If tranquillizers are taken, the conscious mind and body may be relaxed, but deep-rooted worrying still goes on. Pranayama can be used effectively to bring about total relaxation and emotional integration, because in this system

perpetual awareness is maintained while bringing the mind down to deeper levels of the subconscious.

Yoga says that the prana, the breath and the mind are interrelated. When the mind is disturbed, the pranas are also disturbed. When the pranas are disquiet the mind also becomes disquiet. When one concentrates on the breath, the mind becomes concentrated. When one concentrates on the mind, the pranas become quiet. Just as electricity, light and heat are inseparable, the prana and the mind are inseparable.

Pranayama revitalizes and gives one the energy needed to manage daily problems and overcome all obstacles on the journey through life. During moments of anxiety, insecurity, fear and passion, instead of fighting with the mind through the intellect, take the help of pranayama to stabilize the mind. It is the way to mental peace, physical health, revitalization and longevity.

Pranayama brings new levels of awareness by stopping or restraining distractions of the mind. In other words, it is the continual conflict within the mind that prevents us from experiencing higher states or dimensions of awareness. Pranayama practices reduce thoughts, mental conflicts, etc. to a minimum and can even stop the mind processes completely. This restraint of mental activities allows one to know higher levels of existence.

Here is an analogy. If one stands in a room and looks at the sun through a dirty window then the rays of the sun cannot be seen or felt in their full purity. If the window is cleaned then the sun can be experienced in its true glory. The mind in its normal state is the dirty window. Pranayama cleans the mind and allows the consciousness to shine through unobstructed. It becomes obvious that pranayama means far more than breath control.

An aspirant of pranayama need not worry about the mind, the mind does not exist for him. For the aspirant of pranayama, the wild mind, this dirty and foul mind does not exist, because as the practice of pranayama goes on, the pranic force keeps pushing into the dark areas of

consciousness and life, and as this happens, the mind is evaporating.

The individual mind is a concept; there is no individual mind. There is no thought process. Thoughts are impressions. Reading something creates an impression. One becomes aware of impressions stage by stage, and so it seems that they are moving. But thoughts don't move – they don't travel into the past, present and future, they are just there, that's all.

When the structure of the physical is changed, the mental substance automatically undergoes a change. The mind is a further manifestation of the body, and when the mind is influenced, the spirit is also influenced. Body, mind and spirit are not 'the trinity' – they are the unity, one.

—*Swami Satyananda Saraswati*

The following pranayama practices are beneficial in the management of hypertension and conditions of the coronary system:

- Breath awareness
- Abdominal and yogic breathing
- Nadi shodhana pranayama stages 1 and 2
- Sheetalī and sheetkari pranayama
- Bhramari pranayama
- Ujjayi pranayama
- Prana mudra

Besides cooling the physical body, sheetali, sheetkari and kaki mudra cool the mind and soothe mental tension. They are therefore useful for alleviating psychosomatic diseases such as high blood pressure. The practices also purify the blood and improve digestion.

—*Swami Satyananda Saraswati*

In bhramari pranayama the humming sound of the bees is produced and traced towards its source. This produces deep mental and emotional relaxation and is extremely effective in cardiac disorders and in other diseases characterized by a high level of mental tension, such as epilepsy and asthma. However it must be learned correctly, because the whole process is very subtle. It is a process of inner absorption into the humming sound, which is produced with very gentle exhalation. The practice must take place effortlessly, without any strain to prolong the vibration unduly, or to make it loud. It should be spontaneous and it can be very soft. It is essentially an internal sound, and when the ears are blocked with the fingers, the patient is instructed to follow the inner vibration and discover the source.

—Swami Satyananda Saraswati

YOGA CAPSULE SADHANA FOR THE MANAGEMENT OF HYPERTENSION

According to the time available for sadhana, the practices can be divided into daily sessions, covering the whole range of practices within a week. Here is an example of a one-week routine:

Asana

<i>Monday, Wednesday, Friday</i>	Pawanmuktasana 1: 5–10 rounds (the series of greeva sanchalanasana is contraindicated) Tadasana, tiryak tadasana, kati chakrasana: 5–10 rounds Marjari asana Saral bhujangasana Ardha shalabhasana Matsya kridasana Eka pada pranamasana
<i>Tuesday, Thursday, Saturday</i>	Pawanmuktasana 2: 5–10 rounds (except jhulana lurhakanasana and naukasana)

Makarasana
Bhujangasana
Hasta utthanasana
Padadhirasana
Eka pada pranamasana

Pranayama

Monday to Saturday

Breath awareness
Abdominal and yogic breathing:
5–10 minutes
Ujjayi: 5–10 minutes
Sheetali or sheetkari: 5–10
rounds
Nadi shodhana stages 1 and 2:
5–10 rounds

Monday, Wednesday, Friday

Bhramari: x 11

Tuesday, Thursday, Saturday

Prana mudra: x 5

One may end the session with a few moments of stillness observing the effects of the sadhana, or with the chanting of a stotra.

The practice of shatkarmas may be included as convenient.

Yoga Capsule – Respiratory System

SHATKARMA AND ASANA PRACTICES

Thickened and immovable joints with consequent lack of free movement give a great deal of discomfort and uneasiness. If the joints move freely, the ligaments and surrounding tissues will be in a healthy condition. By the practice of asanas, free movement is given to the elbow, wrist, ankle, shoulder and spinal joints. Free movement prevents the spine from stiffening and contracting, checking ossification and degeneration of the bones in the spinal column. Muscles of the cervical, dorsal and lumbar regions are also stretched and relaxed. The body is thus kept in a fit condition.

If muscles are not properly exercised, they contract. The blood circulation and nerve force are consequently impeded and functional disturbances of the organs and of the general nerve-tone result. The muscles atrophy. Practice of asanas keeps the muscles, organs and nerves in a healthy condition. Sound functioning of the organs depends upon good healthy nerves.

Yoga, therefore, is the perfect system of physical culture. It is the king of all exercise systems. By practising these yogic exercises the body is made strong and healthy. There is no use theorizing; what is wanted is regular, systematic, sustained practice. An ounce of practice is better than tons of theory. Regularity in the practice is a necessity.

—*Swami Sivananda Saraswati*

The following practices were found beneficial in the management of asthma:

Shatkarma:

Kunjal once a week

Asana:

- Pawanmuktasana 1 – skandha chakra
- Shashankasana and variations
- Makarasana
- Vajrasana
- Shashank bhujangasana followed by ardha ushtrasana/ushtrasana
- Ardha ushtrasana/ushtrasana combined with pranamasana
- Vyaghrasana
- Marjari asana
- Simhargarjanasana
- Padadhirasana
- Bhujangasana, shalabhasana, and dhanurasana in sequence
- Gomukhasana
- Tadasana, tiryak tadasana, kati chakrasana
- Baddha hasta utthanasana
- Utthita lolasana
- Sarvangasana

SHATKARMA AND ASANA BENEFITS

Kunjaj

Asthmatics find kunjaj an excellent practice. Although there is no obvious connection between the lungs and the stomach, for a number of reasons, kunjaj does bring relief. This is confirmed by the large blobs of phlegm which are thrown out by asthmatics during kunjaj. The warmth and salinity of the water thins the mucus, making it easier to expel. There is also stimulation of the sympathetic nervous system, causing the bronchii to become wider. This allows mucus to come

out and air to come in. With the removal of blockages in the respiratory passages, kunjā brings great relief to the asthma sufferer by allowing him to breathe more easily.

People who suffer from asthma can and should perform kunjā when they are actually having an attack, as it terminates the spasm. In this case it is essential that the stomach is completely filled with water to obtain the best results. Though it may be difficult to drink the water down quickly due to shortage of breath, one must try; with determination it can be accomplished. The urge to vomit should be resisted, so that the stomach can be filled to the brim – bloated in fact. The bronchial tubes, which tighten and contract during an attack of asthma, relax as soon as the water is expelled. This brings much needed and instant relief.

—*Swami Satyananda Saraswati*

Shashankasana

Within this physical body there are also rich sources of life-giving chemicals: antibodies, adrenaline, etc. When we need one of them, we are given it from outside in the form of pills, serums or injections. However, if we can revitalize the particular system that produces these chemicals, then we make them for ourselves. This is what we can accomplish through yoga.

Take the example of adrenaline. The patient who is suffering from asthma can produce his own adrenaline simply by practising one posture known as shashankasana. The person sits on his feet, bends forward, places his forehead and arms on the floor and relaxes in this position for ten or fifteen minutes. This is the way Muslims sit during their prayers.

In shashankasana the adrenal glands are reactivated, they secrete more adrenaline and the attack passes off. This is especially effective if it is practised early in the asthma attack, as soon as the person knows that respiratory congestion is

beginning to take place. An asthmatic patient can tell very well when he is going to get an attack. The condition begins to accumulate from the morning, and he begins to feel heaviness in the chest. But if he practises this posture, he starts to feel better very quickly.

How does shashankasana clear up the respiratory congestion? It increases the secretion of adrenaline. Every person with asthma knows that if he has an attack of asthma and goes to the doctor, the doctor gives him adrenaline. However, with shashankasana, he makes it for himself.

This is an example of how, by practising the specific yoga postures, the different endocrine glands are stimulated. The endocrine glands then, in their turn, influence not only the body, but also the emotions, such as anxiety, fear and anger, which can be also controlled by the yoga practices.

—*Swami Satyananda Saraswati*

Dhanurasana

By lying on the diaphragm with the arms stretched back, the heart is given a gentle massage and the chest is fully expanded; dhanurasana is useful in the treatment of various chest ailments. For example, it is suitable for removing the hunching tendency of asthmatics, which aggravates ill health. Dhanurasana realigns the back and thereby improves the breathing processes. This in turn leads to free flow of air through the nasal passages.

—*Swami Satyananda Saraswati*

Gomukhasana

The base position of gomukhasana locks the hips and pelvis, creating a firm base for stretching the sides of the trunk and opening up the chest. It is important to remember that during the practice, the breathing process should take place from the abdomen, not from the chest. While inhaling, the abdomen is expanded; while exhaling, the abdomen is contracted.

Gomukhasana opens up the chest area, expanding the lungs and increasing the breathing capacity. Thus it is beneficial in the treatment of asthma and other respiratory diseases. Due to the opening up of the pectoral muscles at the front of the chest, gomukhasana unlocks much of the tension that is acquired from the stooped posture of day-to-day sedentary living. A lot of tension accumulates in the shoulders; this powerful stretch breaks any shoulder tension, while opening up and improving lung function.

—*Swami Niranjanananda Saraswati*

Sarvangasana

The position of the body during sarvangasana means that the practitioner must breathe abdominally: the pressure between the chest and the chin completely prevents the movement of the ribs towards the head (clavicular respiration) and imposes a severe limitation on expansion of the ribs outwards (intercostal respiration). Only the movement of the diaphragm is unimpeded, apart from the weight of the abdominal organs, and the practitioner is forced to do abdominal breathing.

This asana is particularly useful for people who suffer from asthma, since it obliges them to breathe diaphragmatically, whereas normally they would tend to breathe with an accentuated clavicular respiration.

As for inverted poses generally, the redistribution of the weight of the abdominal organs improves respiration. Additionally, certain nerves which innervate the respiratory system are stimulated, further improving respiratory function.

—*Swami Satyananda Saraswati*

SEQUENCE AND COMBINATION OF ASANA

There is a tendency in asthma sufferers that the shoulders stoop forward. They hunch because there is a problem in breathing. They are just trying to breathe in, so the shoulders are curved forward. It is like armour around the lungs trying to protect the lungs in the belief that if they protect the lungs, they will breathe better. This constriction of the lungs is the condition that does not allow them to breathe in properly.

1. Before asthmatics or those with respiratory disorders start their yogasana, they have to do one thing. They can sit on a bed and bend forward. They can sit on a chair, bend forward. They can sit on a sofa, bend forward. They should then breathe normally here for five minutes. When they sit up straight they will feel like clearing their throat. This practice is a must before any yoga practice for those with asthma or respiratory disorders.
2. In makarasana you can feel an expansion in the chest. There is an opening up of the chest, the shoulders are actually pushed back so the closed shoulders open up the chest. You can stay in that posture for a while until you do not feel any pain in the chest before moving into dynamic practices.
3. Shashank bhujangasana is a good posture to exercise the lungs, to contract and to expand them, to contract and to expand. The muscles are active and moving. It has to be done at least seven to ten times with long and deep breathing. After shashank bhujangasana is completed, the next practice is ushtrasana.
4. In the combination of ushtrasana and pranamasana you create stretch and relaxation, stretch and relaxation. The ribcage and the organs that are contained in the ribcage such as the lungs and the heart, are just banging, bouncing up and down as you walk, as you move, as you run. That is the type of movement of the lungs and heart. The arteries, veins, nerves and muscles that hold them

together also move in this manner, up and down. In these exercises, you are actually pulling all the different nerves of the lungs and heart a little bit, opening them out; gradually, there are times when you can actually feel the opening of the passage inside.

5. Another important series for heart and respiratory conditions is the practice of three asanas: bhujangasana, shalabhasana and dhanurasana. They are the three backward bending asanas that are performed in a group.

—Swami Niranjanananda Saraswati

PRANAYAMA

Prana means life force, and *ayama* signifies regulation or control. Thus *pranayama* means regulating the life force. Sages have linked this life force with the breath in a gross form. Every living being breathes, and through the medium of the breath the flow of prana and life in the body takes place. If one stops inhaling, the lack of prana in the body is felt, discomfort and unrest prevail and if one is forced to keep on holding the breath, death finally comes. For this reason the sages have linked the breath with the life force. According to them, physical health can be gained by controlling prana shakti through the practices of pranayama, thereby sustaining the body. In this context it is written in *Gheranda Samhita* (5:1):

*Athaatah sampravakshyaami praanaayaamasya sadvidhim;
Yasya saadhanamaatre na devatulyo bhavennarah.*

Now I shall explain the technique of pranayama, by the mere practice of which a human being becomes like a god (a deva).

Sage Gheranda has compared the human body to a *deva sharira*, the body of a divine being or god, which is pure, clean, light, free from disease and luminous. He has taught

pranayama with the intention of achieving such a divine body. This indicates that many problems can be eliminated by pranayama practice. Pranayama is the basis of the yogic management of disease. Diseases can be divided into three groups.

The first group is psychosomatic. Disorders related to this group begin with the mind, feelings and thinking. Worries and disturbances like anger, jealousy and hatred, which originate in the mind, influence the body and its internal activities, and various symptoms begin to arise.

The second group consists of disorders due to pranic blockages. When there are obstructions in the flow of prana, and the breathing process is disturbed, ailments related to breathing and blood pressure develop.

The third group originates externally, the external environment affects the body. Diseases like malaria, cholera and many others are caused by microorganisms attacking the body; other causes are pollution and irregular, uncontrolled eating.

Yoga recognizes these three most common causes of disease. There are also many other minor causes and ailments which can be managed with yogic techniques. Sage Gheranda prescribes pranayama for the treatment of all diseases linked with the breathing system and the flow of prana. In the present era, research has proved that a large number of psychosomatic, somopsychic diseases and mental imbalances like distress and worry can be removed by pranayama.

—*Swami Niranjanananda Saraswati*

Pranayama practices beneficial for the management of respiratory ailments:

- Breath awareness
- Abdominal and yogic breathing
- Ujjayi
- Kapalbhathi
- Nadi shodhana 1:1

PRANAYAMA BENEFITS

Abdominal breathing

The lungs are divided in two parts – the upper and the lower lobes. Shallow or thoracic breathing, the normal breathing of people, is wrong, for here you are only using the upper half of the lungs. In the upper half of the lungs, in the shallow breath, there is no absorption of the gases and oxygen from the air into the body.

Oxygen and other gases are absorbed from the air into the body when they come to the lower part of the lungs. In the lower part of the lungs there are air pockets which are known as alveoli. There, the air is trapped, oxygen and other gases are extracted, mixed in the blood, carried to the heart, and distributed to the body. From the yogic perspective, breathing in the lower half of the lungs is the most important factor for optimum health in life. Therefore, in shavasana or any other practice of relaxation, one is observing the breath in the abdominal region. One is seeing the navel move up and down, up and down. One is developing the awareness of the breath in the abdominal region rather than in the upper thoracic region.

The conditions of bronchitis, eosinophilia and asthma are caused when the breathing is shallow and only in the upper half. Asthmatics cannot breathe properly because no air is going down. The air is only going halfway and then coming out, half and coming out. The same happens in bronchitis. When this condition prevails for long periods, eosinophilia sets in. This weakens the lung muscles and the whole respiratory system. Therefore, deep abdominal breathing is important.

—*Swami Niranjanananda Saraswati*

Ujjayi

Ujjayi is one of the most important, yet one of the simplest pranayamas. It is a deep breathing practice which induces a meditative state. It is practised by contracting the glottis. If this is done properly, a slight contraction of the abdomen can simultaneously be detected. It is easy for the practitioner to misunderstand this and make a special point of contracting the abdominal muscles, which must not be done. If the glottis is contracted, there is automatically a slight pulling sensation in the abdominal region.

With each breath there should be a continuous sound emitted from the throat. It should not be loud, it should only be audible to oneself. This sound is caused by the friction of the air as it passes through the restriction that has been made in the glottis by the contraction. The sound will be similar to the gentle sound that a baby makes while sleeping. This form of breathing, together with folding the tongue back in khechari mudra, is known as ujjayi pranayama.

When done correctly, ujjayi sounds soft like a cat purring or light snoring. When a healthy child sleeps at night, he always breathes by contracting his glottis, and the breath can be heard in his throat. Ujjayi is perfected by relaxing the breath rather than forcing it. If one concentrates on the throat and relaxes the breath, it will feel as if the breathing is through the throat. Of course the breath goes through the nostrils, but the glottis is contracted so the feeling is stronger in the throat.

—*Swami Satyananda Saraswati*

Kapalbhati

Kapalbhati cleanses the respiratory system and nasal passages, and removes spasm in the bronchial tubes. Consequently asthma is relieved and may be cured in the course of time. Tuberculosis may be cured by this practice. Impurities of the blood are thrown out. The apices of the lungs receive proper oxygenation and thereby do not afford a suitable breeding ground for bacteria.

The lungs are well developed by this practice. Carbon dioxide is largely eliminated, and the tissues and cells absorb a large quantity of oxygen. The heart functions properly. The circulatory and respiratory systems are toned, and the practitioner enjoys good health.

—*Swami Sivananda Saraswati*

Kapalbhati benefits the respiratory system by cleaning out the lungs and improving their elasticity, resulting in more efficient oxygen-carbon dioxide exchange.

Kapalbhati should certainly be practised by those suffering from respiratory ailments such as bronchitis and tuberculosis. Those who suffer from asthma and emphysema will, from habit and necessity, use forceful exhalation to expel air from the lungs. This tends to induce severe muscular tiredness. Kapalbhati, practised at times other than during an attack, may be useful in making respiratory muscles stronger, as well as improving the general tone of the lungs.

—*Swami Satyananda Saraswati*

With the practice of kapalbhati fresh air reaches the lower peripheries of the lungs, while stale air is expelled. During this practice the respiratory system is activated, and the exchange of oxygen and carbon dioxide is increased. This practice benefits people suffering from respiratory ailments, including chronic bronchitis and tuberculosis.

People suffering from severe asthma and chronic lung disease often develop a habit of using the accessory muscles of respiration to breathe forcibly, and also tend to exhale with increased muscular force, making the muscles tired and causing fatigue. Such people should practise kapalbhati, but not while having an asthma attack.

—*Swami Niranjanananda Saraswati*

YOGA CAPSULE FOR THE RESPIRATORY SYSTEM

According to the time available for sadhana, the practices can be divided into daily sessions, covering the whole range of practices within a week. Here is an example of a one-week routine:

Asana

<i>Monday, Wednesday, Friday</i>	Skandha chakra (PM 1): 10 rounds Tadasana, tiryak tadasana, kati chakrasana: 5–10 rounds Vajrasana Marjari asana Simhargarjanasana Shashankasana and variations Bhujangasana, shalabhasana, dhanurasana in sequence Ardha ushtrasana/ushtrasana combined with pranamasana Gomukhasana Sarvangasana
<i>Tuesday, Thursday, Saturday</i>	Padadhirasana Vyaghrasana Makarasana Shashank bhujangasana followed by ardha ushtrasana/ushtrasana Baddha hasta utthanasana Utthita lolasana Gomukhasana Sarvangasana

Pranayama

<i>Monday to Saturday</i>	Breath awareness Abdominal and yogic breathing: 5–10 minutes Ujjayi: 5–10 minutes Kapalbhati: 5–10 rounds
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One may end the session with a few moments of stillness observing the effects of the sadhana, or with the chanting of a stotra.

The practice of shatkarmas may be included as convenient.

For all practices refer to the book *Asana Pranayama Mudra Bandha*, Yoga Publications Trust, Munger, Bihar, India.

Towards Happiness

PEACE OF MIND

From the teachings of Swami Sivanmunda Saraswati

Man wants happiness. He shuns pain. He moves heaven and earth to get the happiness he wants from sensual objects, and lo, gets himself entangled in the inextricable meshes of Maya. Poor man! He does not know that these objects are perishable and evanescent, finite and conditioned in time, space and causation. And what is more, he fails to get the desired happiness from them.

A rich man has great wealth, but he has no children. And so he is pained at heart. A poor man has fourteen children, but has nothing to eat, and so he is miserable. One man has wealth and children, but his son is a vagabond, and so he is worried. One man has riches and good sons, but his wife is very quarrelsome. No one is happy in this world.

Who is happy then? A sage is happy. A yogi is happy. He who has controlled his mind is happy. Happiness comes from peace of mind. Peace of mind comes from a state of mind wherein there are no desires, no thoughts of objects. You should forget all ideas of pleasure before you enter the domain of peace.

Pleasure and pain are in the mind only. It is subjective. Things, when longed for, are pleasant, but are bitter if not

longed for. Desires are the cause for pleasures. There is neither pleasure nor pain in objects. It is all mental creation, mental perception, mental jugglery. It is only the mental attitude or a certain kind of mental behaviour towards objects that brings joy or grief, pleasure or pain.

Real happiness is within you. It manifests when the mind is concentrated. When the indriyas are withdrawn from the objects outside, when the mind is one-pointed, when you become desireless and thoughtless.

The musk is in the navel of the deer, but it runs here and there to smell it. The chain is on the neck of the damsel, but she runs hither and thither in search of it. The precious diamond is within you, but you run after the broken pieces of glass in vain. Even so, the ocean of bliss is within you; the fountain of joy is within you; and yet, you run here and there in search of it.

Live where you may, but discipline the mind and the senses. Purify the mind by japa, satsang, charity, control of mind, self-restraint, selfless service, study of the *Bhagavad Gita*, the Upanishads and the *Yoga Vasishtha*, practice of yama and niyama, pranayama, vairagya and tyaga. You will then get a proper instrument for meditation, a calm, sharp, subtle, one-pointed mind.

Though surrounded by pleasurable or painful objects to disturb your equilibrium of mind, remain immovable as a rock, receiving all things with equanimity. Be always cheerful. Laugh and smile. Try to be happy always. Happiness is your very nature.

CONTROL OF MIND

From the teachings of Swami Satyananda Saraswati

We have to note one important thing about yoga: it is a method by which we can control the anarchical tendencies of our mind. Please remember this. Yoga is not for suppressing the mind. No, yoga is not an act of suppression. To illustrate this, even as we control the waters of a river, through the method of channelization, and use those channels for constructive purposes of irrigation in agriculture, in the same manner, the mental energy which gets dissipated and distorted in emotional breakdowns, in worries, in jealousy and hostility, in pride and egoism, in passion, anger and greed, all that mental energy must be channelled in the proper way or one will suffer dire mental problems.

Man thinks. That thinking is an action, thinking is a reflection of the human cerebrum, the thinking mind. The brain of man keeps on moving. Those tiny cells in the brain keep on working with the influxes of the blood: and our thoughts control these influxes of blood. Neurons in the brain, are controlled by thoughts, (this has been proved by scientific experiments.) A particular thought can bring about a heart attack; you know this already. A particular thought can increase the blood pressure immediately. Asthma and similar diseases have their origin in emotional upsets.

Yoga practices are very effective methods by which the mind can be controlled. The mind cannot be tamed by philosophy, not by reading a lot of books on this subject, not even by leading a religious life. Only by a yogic life can one control the mind, can one control the physical brain, can one control the physical heart, can one control the physical aspects of the brain, the psychological aspects are also simultaneously controlled.

Yoga means mental control. You please go through Chapter 18 of the *Bhagavad Gita*. It talks about control, it does not talk about renouncing life; it does not talk

about renouncing your wife and children, property and accomplishments. It says, "Have everything with you, but have perfect control over the reactions, over the effects of the actions of the mind." You do your karma, you do your duty, but they should not affect you, they should not bring about a crisis in your life. This is the fundamental teaching of yoga according to the *Gita*. Another scripture, the *Yoga Sutras* of Rishi Patanjali, which is the most important one in yoga, says in the beginning: "What is yoga? To have automatic control, to have voluntary control, to have spontaneous control over the mind, its tendencies, its fluctuations, its dissipation, is yoga."

When your mind is happy, you must have the capacity to hold that happiness. If your mind is calm, you must have the capacity to hold it there. If the mind is taking you along the wrong path, you must say "No!" I don't want it, and you must bring it back. You must be like a trained horseman. You must be like a good driver with a car, so that when your car is going at full speed, and the traffic is according to your wish, you should be relaxed but still in control. You should use your car by all means; it does not mean that you should keep your car in the garage as an ornament and then go on foot. The message of yoga is to exercise the mind every day, just a little, so that you have conscious control over the reactions of the brain.

We people need a strong mind and this mental strength can come by doing yoga. A little of yoga practice will save you from emotional crises. Possibly if there are conflicts in your personality, you can do something about them. I will not tell you that just by a few days practice of yoga, you can become free from conflicts; these are very difficult to remove, but it is true that by the practices of yoga, you can bring about harmony between your two personalities. Bhoga means suppression and yoga means union. When two things become one, that is called yoga. Now what are those two things that become one in yoga?

Every man has two personalities, the subconscious personality and the higher personality. You are something to

yourself and something else to me. This schizophrenia is an attitude; it can be called a split personality. Man has two personalities, we are two personalities, and the two personalities should be fused into one, and that is the ultimate aim of yoga; so that what you are inside that you are outside. And what you are outside that you are inside. If I am a thief, I am a thief to me, I am a thief to all. If I am a good man, I am a good man to me, I am good man to all. This particular fusion of the split personality into one is called yoga. It is not possible in one day; it takes time.

With action, work or karma on one hand, and yoga on the other hand, we should travel smoothly through life. Remember that this modern civilization, which has been a matter of allurements to us, is not complete and it is not final. It is only a phase. It is necessary that we accept the modern culture and civilization, because it is a part of human life, but we have to understand its limitations. We have to supplement it with yoga. Yoga is for the mind, and civilization is for your worldly comforts. With both you will survive in the culture and it will be possible for you to attain happiness.

A RAY OF HOPE

From the teachings of Swami Niranjanananda Saraswati

Many thousands of years ago, Parvati asked her consort and guru, Lord Shiva, "In this creation, this manifest dimension, this world, this nature, everything is transient, nothing is permanent. There is so much pain, suffering, anxiety and frustration here. What can one do?" Shiva replied, "There are methods and practices by which one can overcome the pain and the suffering, recognize the causes of pain or suffering in a particular moment and overcome them. However, the best way to manage any pain or suffering is to remain happy. Therefore always be happy." In this way, happiness became the first yama.

Any negative state of mind can be managed by being happy, by smiling and laughing. Even depression can be managed by being happy. You may wonder, 'If I am unhappy, if I am suffering and depressed, how can I be happy?' Yes, you can be – because happiness is your natural state of being. It is a limited understanding of happiness when you think that you need a cause or a trigger to be happy or that if the circumstances are difficult you cannot be happy.

This can be understood when you look at children. They also cry, become angry, don't want to eat this or that food, but this state does not last. Immediately afterwards they are laughing with an innate happiness; the circumstances are superficial and irrelevant to their happiness. Think of the laughter of children. Why does it sound so beautiful? Because it is natural, and not a result of any circumstance or joke.

That happiness, which children express, continues to be a part of you. However, adult life makes you forget it. With the onset of teenage years, grumpiness comes. It may be a result of hormones, technically speaking, but this is when you begin to move in a different direction. Your awareness connects more and more with external circumstances, and they buffet you. To be spiritual is to move back into that natural state, which is happy without cause. That is what you have to learn to connect with, experience and express.

As long as you are dependent on a cause to make you happy, the absence of that cause will make you unhappy. For example, you sing a very nice kirtan, everyone praises you and you feel very happy. The next day you don't sing well, someone else sings much better than you and they receive all the praise, and you feel dejected and unhappy. Therefore, if you depend on external circumstances to make you happy, you will always be swinging between happiness and unhappiness. This is samsara. To develop samskara, to maintain equipoise between the opposites and become a yogi, you have to tap into the positivity without cause, which exists within.

If you can learn to consciously move into that natural experience of happiness, which is not dependent on any cause, then you will be able to change your mood, the behaviour of your mind, your character, traits and the whole personality. Your anxiety, tension, depression and frustration will disappear. Happiness is connecting with a ray of hope rather than getting fidgety in the cloud of gloom. It is a quality that has to be nurtured.



Yoga does not go by beliefs; it goes by investigations and discoveries. I want to develop the scientific side of yoga with the help of open-minded examiners and investigators because yoga science has much to contribute to the good of humanity.

I am absolutely sure about it. It is science, scientists, and scientific thinking which will preside over the destiny of humankind, and this science will recognize the potential of yoga for humanity.

—Swami Satyananda Saraswati

Volume Two of Yoga Research Publications presents research carried out on the effects of yoga practices for physical conditions of Type II diabetes mellitus, high blood pressure and asthma. Swami Sivananda, Sri Swami Satyananda and Swami Niranjanananda share their insight into the cause of these specific conditions and the possibility of managing them through yoga. The importance of a yogic lifestyle is emphasized and a yoga capsule for each condition is proposed as a practical discipline for one's day-to-day life.



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